Teddington Direct River Abstraction
EIA Scoping Report

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

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0.1 Background

0.1.1 Thames Water Utilities Ltd (hereafter referred to as 'Thames Water' or the 'Applicant') is seeking an Environmental Impact Assessment (EIA) Scoping Opinion under Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (hereafter referred to as the 'EIA Regulations') for the proposed Teddington Direct River Abstraction (DRA) project (the 'Project').

0.1.2 The Project is aimed at enhancing London's drought resilience by 2033 by abstracting up to 75 mega litres of water per day (Ml/d) from the River Thames during low flow conditions. Without the Project, London faces significant water shortages by 2050 due to population growth and climate-related drought risks.

0.1.3 The Project involves new abstraction and treatment infrastructure, a 3.5m internal diameter conveyance tunnel, and a discharge system for recycled water. The Project will operate intermittently, primarily between August and November. A new tertiary treatment plant (TTP) at Mogden sewage treatment works will treat a portion of the final effluent to produce up to 75Ml/d of recycled water, which will be discharged downstream of the abstraction site.

0.1.4 The Project involves complex construction, including tunnel boring, shafts, and conveyance routes, with completion of construction expected in 2031 and operation starting in 2033. Environmental impacts will be assessed, with planned key stakeholder consultations, which will be used to refine the Project design.

0.1.5 During non-operational periods, the TTP will maintain a reduced flow of approximately 15Ml/d to keep the system operable. This flow helps sustain the biomass in the treatment process, with the recycled water being added to the final effluent channel and discharged at Isleworth Ait.

0.1.6 The Secretary of State (SoS) for Department for Environment, Food and Rural Affairs gave a direction in relation to the Project under section 35 of the Planning Act 2008 on 22 December 2023. As such, the Project is required to be consented by way of a Development Consent Order.

0.1.7 The EIA process involves producing three main documents: the Scoping Report, Preliminary Environmental Information (PEI) Report, and Environmental Statement (ES). This EIA Scoping Report provides the Project's scope, methodology, and mitigation plans for likely significant effects. The EIA Scoping Report seeks agreement on the scope and level of detail for the ES, providing information on the Project's location, technical capacity, and potential environmental effects. The EIA process will evaluate

potential environmental impacts, including impacts on population, health, biodiversity, water, and other factors, using professional judgment and consultation. Mitigation measures, cumulative effects, and monitoring are included to manage adverse effects, with flexibility allowed for design changes during the assessment process.

0.1.8 The design evolution of the Project involved several refinements, including adjusting the size of the TTP and conveyance route, reducing the number of shafts, and optimising intake and outfall locations, with an aim to minimise environmental impacts and improve operational efficiency.

0.1.9 The consultation process for the Project involves formal feedback from statutory authorities and stakeholders on environmental impacts, including public consultations and engagement since 2020. Non-Statutory Public Consultation in 2023 gathered input from local communities and stakeholders. Ongoing consultation will continue throughout the Project, with statutory consultation anticipated in 2025.

0.2 Scoping Summary

0.2.1 These are the aspects that are proposed to be scoped into the EIA:

- Air Quality
- Noise and Vibration
- Historic Environment
- Terrestrial Ecology
- Aquatic Ecology
- Ground Conditions and Contaminated Land
- Townscape and Visual Amenity
- Water Resources and Flood Risk
- Human Health
- Carbon and Climate Change
- Socioeconomics, Community, Access and Recreation
- Waste and Materials
- Traffic and Transport
- Cumulative Effects

0.2.2 Major Accidents and Disasters and transboundary effects will be scoped out. Within the aspects referenced above, it is proposed certain matters will be scoped out, as explained within the individual aspect chapters (Chapters 6 to 20). This is based on the baseline and current Project proposals and whether the Project is likely to have significant effects on relevant receptors.

0.2.3 The Planning Inspectorate will review this report, take account of comments provided by consultees, and provide a Scoping Opinion. The Scoping Opinion will confirm which aspects are to be scoped in or out of the EIA process, and the PEI Report and ES will be based on the Scoping Opinion adopted by the SoS.

1 Introduction

1.1 Background

1.1.1 Thames Water Utilities Ltd (hereafter referred to as 'Thames Water' or the 'Applicant') is seeking an Environmental Impact Assessment (EIA) Scoping Opinion under Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (hereafter referred to as the 'EIA Regulations') for the proposed Teddington Direct River Abstraction (DRA) project (the 'Project').

1.1.2 The Secretary of State (SoS) for Environment, Food and Rural Affairs (Defra) gave a direction in relation to the Project under section 35 of the Planning Act 2008 on 22 December 2023[1,2]. As such, the Project is required to be consented by way of a Development Consent Order (DCO).

1.1.3 The Project would comprise a new abstraction site on the River Thames close to Teddington Weir, allowing for the abstraction of up to 75 Mega-litres[3] per day (Ml/d) of river water when river levels are low and allowable abstraction rates are insufficient to maintain water levels in London's storage reservoirs thereby providing additional drought resilience during such times. The abstracted water would be transferred through a new pipeline connecting to an existing underground tunnel, the Thames Lee Tunnel (TLT), to Lockwood Pumping Station, part of Thames Water's Lee Valley reservoirs in North London.

1.1.4 The Project also includes a new tertiary treatment plant (TTP) proposed within the existing Mogden sewage treatment works (STW) site boundary. The TTP would treat a portion of the final effluent from the STW to a higher standard. This recycled water would, once treated, be transferred via a new conveyance tunnel to connect with a new discharge outfall close to, and downstream of, the proposed abstraction site for the Project. Here, the conveyed recycled water would be discharged to the River Thames, upstream of Teddington Weir, to fully compensate for the water being abstracted from the River Thames.

1.1.5 The Project would provide up to 75Ml/d of additional water supply to London during certain conditions, delivering enhanced (1-in-200) drought resilience benefits from 2033. The general location of the Project is indicated in Figure 1.1 along with the EIA Scoping Boundary. The EIA Scoping Boundary is also shown in Plan 1.1 in Appendix A. The purpose of this EIA Scoping Report is to support a request to the Planning Inspectorate (PINS) for an EIA Scoping Opinion for the Project within the EIA Scoping Boundary shown. Given the scale of the Project it has been assumed that EIA is required and a request for a Screening Opinion from PINS has not been made.

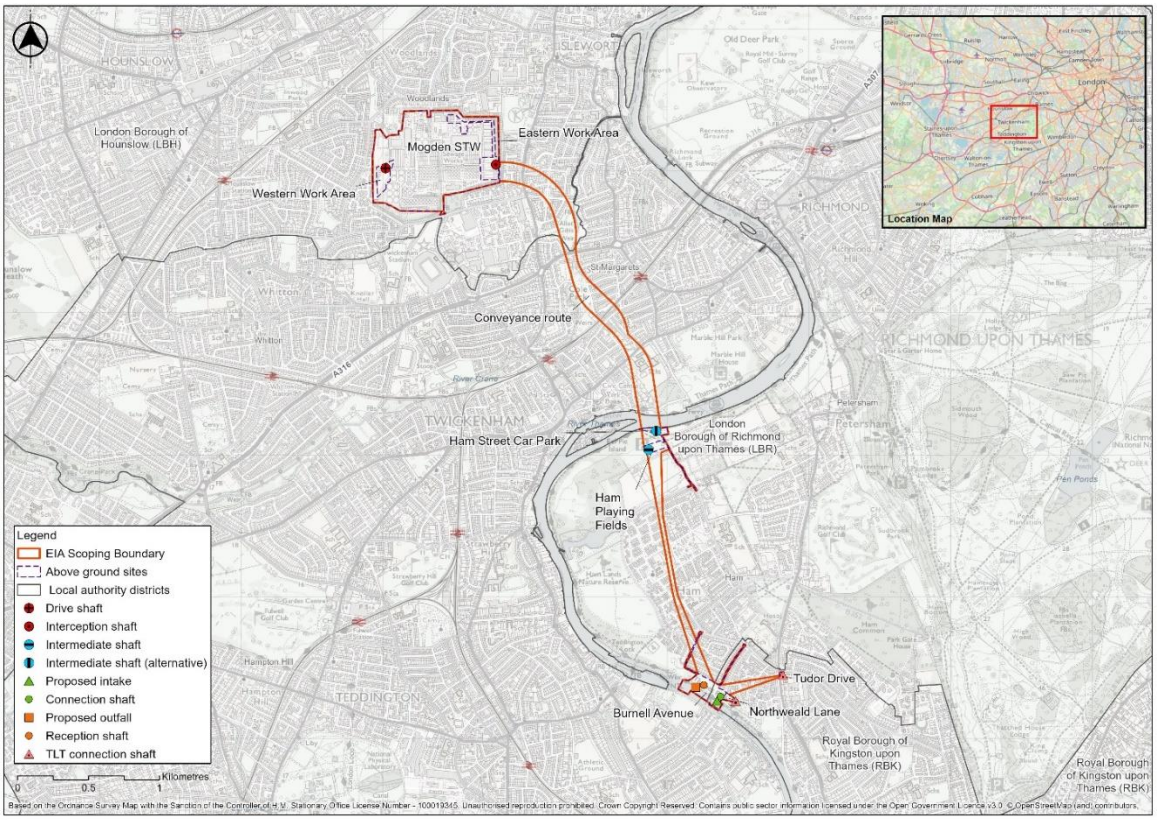


Figure 1.1 Location plan

1.2 EIA Notification and Scoping Request

1.2.1 The Applicant proposes to submit an Environmental Statement (ES) in support of the application for development consent to PINS, who will examine the application on behalf of the SoS for Defra. The purpose of EIA is to protect the environment by ensuring that decision makers, when deciding whether to grant consent for a project which is likely to have significant effects on the environment, do so in the full knowledge of the likely effects and take this into account in the decision-making process[4].

1.2.2 The EIA process is '*a systematic process to identify, predict and evaluate the environmental effects of proposed actions and projects*'[5]. There are three main EIA documents produced as part the pre-application process for developments requiring development consent under the Planning Act 2008 (as amended). These are:

- Scoping Report: The Scoping Report sets out the potential for likely significant effects from a proposed project (scope). It also presents the data collected and the proposed assessment methodology and approach that would be used during the EIA. The Scoping Report is issued by PINS to consultees for comment on the scope and methodology proposed

- Preliminary Environmental Information (PEI) Report: The PEI Report sets out the information that '*is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development'*[5]. The PEI Report is used by consultees to inform their consultation responses during statutory consultation on a proposed project, and
- Environmental Statement (ES): The ES presents the results of the EIA undertaken for a project. It identifies the likely significant effects that would result if the project was implemented and any proposed mitigation to reduce those significant effects. The ES is submitted as part of the application for development consent and is considered during the decision-making process

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

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

> *'A request under paragraph (1) must include—*
>
> *(a) a plan sufficient to identify the land;*
>
> *(b) a description of the proposed development, including its location and technical capacity;*
>
> *(c) an explanation of the likely significant effects of the development on the environment; and*
>
> *(d) such other information or representations as the person making the request may wish to provide or make'.*

1.2.5 This EIA Scoping Report has been provided in accordance with the above requirements. The information relating to (a) is provided in Plan 1.1 in Appendix A Plans. Information relating to (b) is provided in Chapter 2 The Project. The technical chapters (Chapters 6 to 20) set out the remaining information requirements relating to (c) and (d).

1.2.6 In addition, the following PINS advice notes have been considered:

- Advice on EIA Notification and Consultation
  - Engagement activities with regard to EIA Scoping are set out in Chapter 4 Consultation and Engagement and in each technical aspect chapter

- Nationally Significant Infrastructure Projects – Advice Note Seven[6]: Environmental Impact Assessment: process, preliminary environmental information and environmental statements

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

- The Proposed Development
  - An explanation of the approach to addressing uncertainty where it remains in relation to elements of the Proposed Development e.g. design parameter is set out in Chapter 2 The Project and Chapter 3 Design Evolution
  - Referenced plans presented at an appropriate scale to convey clearly the information and all known features associated with the Proposed Development as shown in figures within the technical aspect chapters and Appendix A Plans
- EIA Approach and Topic Areas
  - An outline of the reasonable alternatives considered and the reasons for selecting the preferred option is set out in Chapter 2 The Project and Chapter 3 Design Evolution
  - A summary table depicting each of the aspects and matters that are requested to be scoped out allowing for quick identification of issues is set out in Chapter 21 Scope Summary and ES Structure, and at the end of each technical aspect chapter
  - A detailed description of the aspects and matters proposed to be scoped out of further assessment, with justification provided, is set out in each technical aspect chapter
  - Results of desktop and baseline studies where available and where relevant to the decision to scope in or out aspects or matters, are set out In each technical aspect chapter
  - Aspects and matters to be scoped in, the report should include details of the methods to be used to assess impacts and to determine significance of effect e.g. criteria for determining sensitivity and magnitude. These are set out in Chapter 5 EIA Methodology and in each technical aspect chapter.
  - Any avoidance or mitigation measures proposed, how they may be secured and the anticipated residual effects are set out in each technical aspect chapter
- Information Sources
  - References to any guidance and good practice to be relied upon are included in each technical aspect chapter
  - Evidence of agreements reached with consultation bodies (for example the statutory nature conservation bodies or local authorities) is provided in each technical aspect chapter and Chapter 4 Consultation and Engagement

- An outline of the structure of the proposed ES is set out in Chapter 21 Scope Summary and ES Structure

1.2.8 Thames Water is aware of the recent updates to the PINS advice notes. Advice on environmental matters published on 20 September 2024, relevant to this Project, are listed below:

- Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment
- Nationally Significant Infrastructure Projects: Advice on Transboundary Impacts and Process
- Nationally Significant Infrastructure Projects: Advice on Habitats Regulations Assessments
- Nationally Significant Infrastructure Projects: Advice on the Water Framework Directive
- Nationally Significant Infrastructure Projects: Advice on EIA Notification and Consultation

The recent updates also include:

- Nationally Significant Infrastructure Projects: Commitments Register

1.2.9 Thames Water acknowledges and has had regard to the updated advice notes and has implemented the advice where possible and necessary. Thames Water will develop a Commitments Register utilising the advice provided by PINS and will ensure that it is available to support the PEI Report.

1.3 Purpose of this Report

1.3.1 This EIA Scoping Report has been prepared in accordance with Advice Note Seven[7] to seek a Scoping Opinion from PINS, on behalf of the SoS. This EIA Scoping Report sets out the Applicant's intended approach to EIA in terms of the scope, methodology and content of the ES that will accompany the DCO application for the Project. This report also outlines environmental features and constraints that have been identified from desk-based studies and preliminary field surveys as well as a description of the potential effects that could arise from the Project.

1.4 The Applicant

1.4.1 Thames Water is a private company that supplies around 2,600 million litres per day of water to around 10 million people and 220,000 businesses and is the UK's largest water and wastewater services company. Its activities span a large area of south-east England, over six separate Water Resource Zones. These areas include London as well as parts of Berkshire, Gloucestershire, Hertfordshire, Kent, Oxfordshire, Surrey and Wiltshire; from Cirencester in the west to Dartford in the east and from Banbury in the north to Guildford in the south, covering over 13,000km^2. Thames Water obtains

its water supply from a mix of surface water sources (mostly from large storage reservoirs supplied from the River Thames and River Lee) and groundwater sources. The Applicant also has a desalination water treatment works on the River Thames (Tideway) that can supplement water supplies at times of high demand and/or during drought conditions.

1.5 Context of the Project

Project need

1.5.1 Within Thames Water's catchment the London Water Resource Zone itself is a large, conjunctive use zone, involving both surface water and groundwater abstraction. The zone is supplied by surface water resources, whereby water from the River Thames and River Lee is abstracted into large reservoirs in west London and north east London, respectively, before treatment at water treatment works and subsequent distribution. There is storage in west London spread across 10 reservoirs and the Lee Valley reservoir complex in north east London, is spread over 13 reservoirs. Supply in south east London is dominated by groundwater sources. There are around 30 sources across this area, which together supply up to around 300Ml/d.

1.5.2 The region has a large population and receives comparatively little rainfall in comparison with other regions and so is considered water stressed. Whilst new sources of groundwater are in the process of being identified, these will not yield sufficient supply to ensure a secure and sustainable water supply for future generations.

1.5.3 Accordingly, Thames Water, alongside many other water companies in England, has identified the need, through its existing and revised draft Water Resources Management Plan (dWRMP)[8] to invest in new sources of water over and above new groundwater sources. Thames Water's WRMP for the period 2025 – 2030 was approved on the 4 September 2024 by the SoS for Defra. On reaching the decision to approve Thames Water's plan, the Secretary of State concluded that there is a strategic need for major projects including this Project. In tandem, the Environment Agency's "*Meeting our future water needs: a national framework for water resources*" (March 2020)[9] (the National Framework) plans for England's future water needs and sets out actions required to ensure resilient water supplies. It is also reported that if no action is taken between 2025 and 2050, approximately 3,435 million extra litres of water per day will be required in England to address future pressures[10,11]. Within this context, the scale of the future water resources required for Thames Water's catchment demands that it takes a strategic approach to planning for the future water supply to its customers.

1.5.4 The Framework requires water companies to work together in regional groups to produce regional plans. Each regional group must produce a

single plan that builds resilience to a range of uncertainties and future scenarios. The groups are required to develop a preferred plan for the region, through a set of options that represent the best value to customers, society and the environment. To ensure a secure sustainable water supply for future generations, Thames Water has worked with five other water companies (as part of Water Resources South East (WRSE)).

1.5.5 This context has also been recognised by Ofwat, which has provided funding for water companies to investigate, then develop, Strategic Resource Options (SROs)[12] to help meet the water needs set out in the National Framework, that will benefit customers and wider society, and help to protect and enhance the environment. Thames Water has taken the lead on investigating several SROs that could provide a large volume of water to help meet that demand, including during drought conditions.

1.5.6 The range of SROs under investigation by Thames Water were identified in the Price Review 2019 Final Determination, following submission of its dWRMP in 2019, with funding allocated to Thames Water to carry out further investigation and progression of schemes. Out of a total of 18 SROs under investigation across the UK, Thames Water has worked collaboratively on exploring five of those schemes, all of which have also been considered in the WRSE Regional Plan.

1.5.7 The Teddington DRA project is one of the core projects selected by WRSE in its Regional Plan, and the selection of the Project in both the Regional Plan and Thames Water's revised dWRMP is consistent. The most recent publication by WRSE is the Revised Draft Regional Plan (August 2023) which identifies the Project as being required for first utilisation by 2033 as a 75Ml/d scheme.

1.5.8 The development of all of these nationally important schemes is being overseen by the Regulators' Alliance for Progressing Infrastructure Development (RAPID), an alliance of regulators formed to help accelerate the development of new water infrastructure. Thames Water submitted Gate 2 assessments to RAPID for this Project in November 2022[13].

1.5.9 The Teddington DRA project is a water recycling scheme that takes final effluent (treated wastewater) from a STW and treats it again to a higher standard before discharging it back into a watercourse. Such schemes like the Project play a particularly important role in addressing areas of water supply known to be at risk during times of drought and water shortage, where they can be used to achieve resilience through their operation during the lead up to or within periods of drought.

1.5.10 The key objective of the Project is to help address a forecast deficit in water supply during drought conditions for a projected population of over 12 million people in London by 2050 with growth predicted of over 100,000 people a year. The Project is a strategically important water resource for London, and

therefore due to the social, economic and environmental significance of London for the south of England and the UK as a whole. It will play a critical role in meeting the water resources needs and resilience of this large geographical region.

1.5.11 National planning policy was designated for water resources infrastructure projects in the National Policy Statement (NPS) for Water Resources Infrastructure in 2023[14]. The NPS sets out the need, and UK Government policies, for development of nationally significant infrastructure projects (NSIPs) for water resources in England.

1.5.12 Paragraph 1.4.5 of the NPS states:

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

1.5.13 On this basis, the EIA is not expected to set out the need for the Project. The legislative and policy context of the Project is set out in Appendix B National Planning Policy and Legislation Context.

Geographical context

1.5.14 The Project is located in west London and falls within the boundaries of three Local Planning Authorities (LPA) administrative areas, the London Borough of Hounslow, the London Borough of Richmond upon Thames and the Royal Borough of Kingston upon Thames (see Chapter 2 The Project for further details of locations of the Project components).

1.5.15 The environmental context of the LPAs varies significantly from the heavily urbanised residential areas within Hounslow, to Richmond and Kingston characterised with a variety of built urban centres such as Teddington and Twickenham, and historic and natural environments with landmarks such as Richmond Park, Hampton Court Palace, Ham House and Ham Lands, and Bushy Park. There are a range of services including shops, schools, religious centres, supermarkets, sports facilities and restaurants. Allianz Stadium Twickenham is a prominent feature of the area, being an important sporting asset and regular host for international sports fixtures, music concerts and conferences. The River Thames passes through all three boroughs and is important for navigation, water supply, ecology, leisure and landscape character.

1.5.16 There are a number of public transport networks including overground and National Rail lines, two London Underground lines (District and Piccadilly)

and numerous bus routes. The Project is also a short distance from Heathrow Airport, a global hub for international air travel. The area is well connected to the highways network including major arterial roads (A316, A315, A305, A307, A4, A406) and trunk roads (M25, M3 and M4) in and out of London.

Environmental context

1.5.17 There are a number of protected or sensitive sites and areas within close proximity of the EIA Scoping Boundary as described in Table 1.1 and are shown on Plan 2.1 in Appendix A.

Table 1.1 Protected and sensitive receptors within proximity of the EIA Scoping Boundary (distances provided)

Receptors	Reason for designation	Distance from EIA Scoping Boundary
Isleworth Ait Local Nature Reserve (LNR)	Designated for mixed woodland of poplar and willow. Species include treecreeper, kingfisher and heron, rare beetle and mollusc species.	930m
Ham Lands LNR	An area of grassland, scrub and wildlife. Butterfly and bird species present.	Within
Ham Common, Richmond LNR	Birch and oak woodland with wet hollows and acid grassland. Species include remote sedge, cow-wheat and purple hairstreak butterfly. Owls and other birds present.	400m
Mogden Sewage Works Site of Importance for Nature Conservation (SINC)	Tall earth banks and a series of sludge lagoons which provide habitats from bare mud to tall herbs and willow woodland.	Within
Moor mead recreation ground SINC	Informally managed short grassland, at boundaries longer swathes with wild flowers are present.	Within
Ham Lands SINC	Area of restored gravel pits beside the River Thames which contains a mosaic of habitats including grassland, scrub and woodland. In the north-west is a low lying area of original flood meadow that floods.	Within

Receptors	Reason for designation	Distance from EIA Scoping Boundary
River Thames and tidal tributaries SINC	The River Thames and the tidal sections of creeks and rivers which flow into it comprise valuable habitat. The mud-flats, shingle beach, inter-tidal vegetation, islands and river channel itself support species from freshwater, estuarine and marine communities. Of particular importance for wildfowl and wading birds.	Within
River Crane at Margarets (Richmond Site) SINC	The river is divided into two channels with trees and shrubs, kingfisher regularly recorded.	Within
Royal Park Gate Open Space SINC	Scrub, trees and an area of semi-improved neutral grassland, where patches of rough grassland are interspersed with frequently mown grass paths.	Within
The Isleworth Pottery Scheduled Monument	A mid C18 to early C19 Pottery representative of its period and type.	700m
Ham House Registered Park and Garden	Gardens and pleasure grounds attached to a C17 house. The grounds were restored in late C17 style in 1975-6.	Within
Kew Royal Botanic Gardens Registered Park and Garden	A botanic garden established in the early C18 and increased in size under Sir William Hooker in the mid C19. The gardens were set within a royal park and remodelled periodically by leading designers.	700m
Marble Hill Registered Park and Garden	Remains of C18 garden and park created for Henrietta Howard, Countess of Suffolk by, amongst others, Alexander Pope and Charles Bridgeman.	150m
York House Registered Park and Garden	An early C20 garden with C19 elements forming the setting for a C17 town mansion.	100m
Mogden House Grade II listed building	House. Early to mid C18, extended circa late C18.	Within

Receptors	Reason for designation	Distance from EIA Scoping Boundary
Riverside House Grade II listed building	Early C19 brick built 2-storey house, 4 windows wide plus a segmental bay to the left 3-windows wide.	Within
Orleans House The Octagon room and service wing adjoining Grade I listed building	Orleans House was built in 1710 for James Johnston, Queen Anne's SoS for Scotland.	Within
Ferry House Grade II listed building	C18. White stucco. Hipped slate roof. Three storeys.	15m
Worton Hall Grade II listed building	Former film studios, now owned by the Coal Board (June 1969) and much altered internally.	65m
163 and 165 Richmond Road Grade II listed building	Pair of villas, 1839 - 40, with later C19 rear extensions.	65m
Twickenham Riverside Conservation Area	An area designated in recognition of the historic and architectural value of the original village core and river frontage.	Within
Ham House Conservation Area	The conservation area is focused on Ham House and its estate, an example of a 17th century country house and grounds in a rural setting by the River Thames.	Within
Amyand Park Road Conservation Area	Conservation area situated between the railway line and Richmond Road, to the northeast of central Twickenham. An attractive area of late Victorian and Edwardian buildings.	Within
Riverside North Conservation Area	A linear area whose landscape is influenced by the River Thames, alongside which lie riverside estates, 19th century public works that established Canbury Gardens, a group of large Victorian/Edwardian houses and late Victorian boathouses fronting the river.	Within

Receptors	Reason for designation	Distance from EIA Scoping Boundary
Crane Valley Archaeological Priority Area (APA)	The river gravels along the Crane Valley have attracted human settlement since the Neolithic. The APA's principal archaeological and historical interest relates to the post-medieval gunpowder industry.	Within
Ham Fields APA	A large area of undeveloped open land along the Thames riverside to the west of Ham. It has the potential to reveal significant archaeological remains of most periods.	Within
Ham APA	Covers the core of the settlement along Ham Street and includes Ham Street Manor House and Grounds. Primarily focussed on the potential to reveal evidence for early medieval Anglo-Saxon, medieval and early modern settlement.	Within
Thames Foreshore and Bank APA	No citation available – part of Riverside North Conservation Area.	33m
Kingston Thames Riverside APA	No citation available – part of Riverside North Conservation Area.	Within
There are many Listed Buildings within 500m of the EIA Scoping Boundary. These are generally concentrated in three main clusters including: Twickenham Riverside Conservation Area; Ham House Conservation Area; and, Ham Common and Parkleys Estate Conservation Areas. 500m study area is considered appropriate to capture all heritage assets that could be affected, either physically or as a result of changes to their settings, considering the nature of the Project.		
Thames Valley National Character Area (NChA)	The NChA encompasses the following local landscape character types: Hounslow Urban Context and Character Study: Isleworth Character Area T, Isleworth Character Area X, Isleworth Character Area Y. Richmond Urban Design Study: C6 St Margarets Residential, E2 Ham Common and Riverside. Kingston Borough Character Study: Tudor 3 YMCA Riverside Lands, Tudor 9 St George's Industrial Estate.	Within

Receptors	Reason for designation	Distance from EIA Scoping Boundary
Thames Path National Trail	Long distance footpath following the River Thames from source.	Within/close proximity
National Cycle Network (Route 4)	Part of the long distance cycling route from London to Fishguard.	Within/close proximity
Flood risk zones (FRZs) 1-3	The Project has shaft sites and infrastructure within all three FRZs.	Within and in proximity
Duke of Northumberland's River	Statutory main river	280m (crosses Mogden STW site)
Whitton Brook	Statutory main river	260m
River Crane	Statutory main river	8m
River Thames	Statutory main river	Intake/outfall within watercourse

1.6 Structure of this EIA Scoping Report

1.6.1 This EIA Scoping Report provides details of the surveys and assessments carried out to date and describes how the Applicant proposes to undertake the EIA. An effective scoping process enables the refinement of the assessment and defines the information required to form the ES. It allows for an early identification of the likely significant effects applicable to the EIA Regulations and provides an opportunity to agree where EIA aspects and issues should be scoped into or out of EIA.

1.6.2 The contents of the EIA Scoping Report are structured as set out in Table 1.2 and the report has been prepared in accordance with section 10 of the EIA Regulations.

Table 1.2 Structure of the EIA Scoping Report

Sections	Contents
Executive Summary	Provides an overview of the EIA Scoping Report.
1 Introduction	Sets out the background, Project overview and the purpose and structure of the EIA Scoping Report.

Sections	Contents
2 The Project	Sets out the proposed elements and an overview of the construction techniques, operational parameters and the environmental context of the site.
3 Design Evolution	Outlines the alternatives considered as part of the design process to date.
4 Consultation and Engagement	Provides an overview of the consultation and engagement held to date for the Project, specifically relating to EIA scoping.
5 EIA Methodology	Outlines the proposed general approach to EIA, including technical requirements, spatial and temporal scope and approach to mitigation.
6 to 18 Environmental aspects	Outline of the existing environment and baseline conditions, sensitive receptors and potential environmental effects, assessment methodology, mitigation and consultation for the following aspects: Air Quality; Noise and Vibration; Historic Environment; Terrestrial Ecology; Aquatic Ecology; Ground Conditions and Contaminated Land; Townscape and Visual Amenity; Water Resources and Flood Risk; Human Health; Socioeconomic, Community Access and Recreation; Carbon and Climate Change; Waste and Materials; and, Traffic and Transport.
19 Cumulative Effects	Sets out the approach to assessment of cumulative effects with other proposed developments.
20 Major Accidents and Disasters	Reports on the potential risk of the Project causing a significant environmental effect in the event of a major accident or disaster.
21 Scope Summary and Structure of the ES	Provides a summary of the proposed scope of the ES and its structure. Sets out the next steps in the EIA process.

1.6.3 Each EIA aspect chapter within this report (Chapters 6 to 18) follows a consistent structure as follows:

- Legislation and key policy review – within each aspect section a legislation and policy review has been undertaken, which seeks to summarise legislation and all national and local policy that is relevant to defining the scope of the EIA aspect section
- Consultation and Engagement – this section details any aspect specific engagement undertaken to date relevant to the EIA aspect

- Existing environment and baseline conditions – to identify the potential for effects of the Project on the EIA aspect, the existing environmental baseline conditions and a projection of how this is anticipated to change in the future using currently available project information have been considered. This includes a review of the available baseline data and where further data needs to be collected
- Sensitive receptors and potential environmental effects – the Project's potential effects and relevant receptors are identified and described. Where any effects are scoped out this is identified and explained
- Assessment methodology – this section sets out the aspect specific methodology that will be used in the ES to identify likely significant effects. Where aspect specific guidelines are available these are referenced. Any assumptions that are made, or limitations to the assessment are also set out
- Mitigation – commitments to mitigation measures are set out where known at this stage and where this could affect the scope of the EIA
- Summary of Scope for the EIA – this section summarises the potential effects and scoping in or out of aspects and matters

1.6.4 Additional information supporting EIA aspects sections are provided in appendices:

- Appendix A Plans
- Appendix B National Planning Policy and Legislation Context
- Appendix C Air Quality Monitoring Data
- Appendix D Odour Technical Note
- Appendix E Habitats Regulations Assessment Screening
- Appendix F Water Framework Directive Screening
- Appendix G Cumulative Assessment Stage 1 and Stage 2 list

2 The Project

2.1 Introduction

2.1.1 This chapter describes each of the Project components in more detail, including how they could be constructed and operated based on the current design. The purpose is to provide an initial description of the scale, nature and duration of construction works, the proposed form of the completed Project and its operation for providing additional water supply, such that potential environmental and social impact pathways can be identified.

2.1.2 This enables the scope and approach to assessing impact pathways considered, to establish the potential for likely significant effects, and for non-relevant impact pathways or matters within them to be identified and scoped out of the Environmental Impact Assessment (EIA). This is important to help achieve a proportionate EIA. It should also be noted that information outlined in this chapter is based on present knowledge and design maturity at the time of writing.

2.2 Description of the Project, Site and Surroundings

Project overview

2.2.1 The Project is a drought resilience scheme that would provide additional water capacity to London during certain conditions. The Project would operate intermittently and would only supply up to the maximum 75 Mega-litres per day (Ml/d) when required. Modelling scenarios have indicated that the Project would typically operate during low flow periods in the River Thames and on average once in every two years, primarily between the months of August to November.

2.2.2 The Project involves a new abstraction site on the River Thames close to Teddington Weir. The abstracted water would be transferred to Lockwood Pumping Station, part of Thames Water's Lee Valley reservoirs in north east London, and replaced by recycled water from a new tertiary treatment plant (TTP) within the existing Mogden sewage treatment works (STW). See Figure 2.1 for the schematic of the Project. The Project comprises the following principal components:

- Tertiary treatment facilities to recycle a portion of the final effluent at Mogden STW within a new TTP with an output of up to 75Ml/d of recycled water
- A tunnel conveyance route with an approximate 3.5m internal diameter (ID) for the transfer of up to 75Ml/d of recycled water between the TTP and the outfall discharge infrastructure

- A tunnel boring drive shaft and recycled water interception shaft at Mogden STW
- An intermediate construction shaft
- A tunnelled conveyance route reception shaft and connecting conveyance route to the outfall discharge located on land to the south of Burnell Avenue, Ham
- A new outfall for the discharge up to 75Ml/d recycled water located adjacent to and either within the southern riverbank of the River Thames or within the river close to Teddington Weir
- A new abstraction intake with an abstraction rate of up to 75Ml/d of river water from the River Thames, located adjacent to and within the riverbank of the River Thames upstream of the new outfall discharge
- An abstraction connection shaft and an approximate 2.2m ID river water conveyance pipeline connecting to the existing Thames Lee Tunnel (TLT) via a new TLT connection shaft

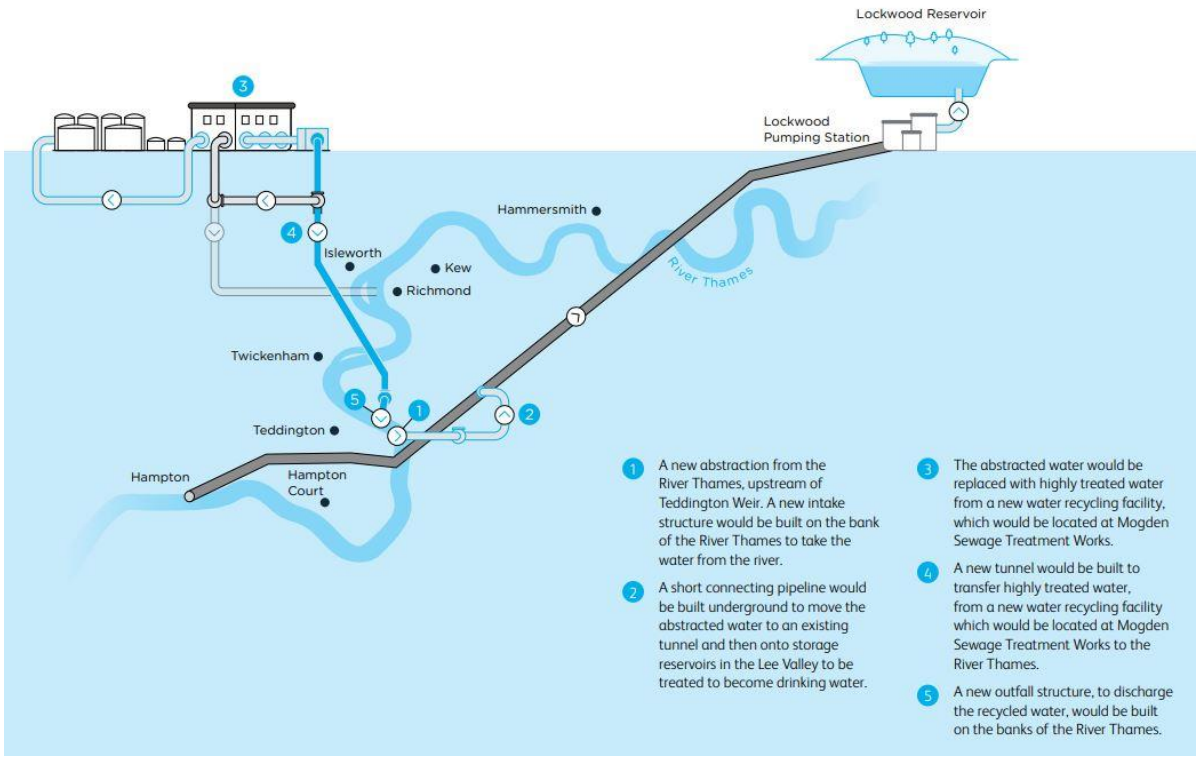


Figure 2.1 Schematic of the Project

2.2.3 A new, approximately 4km long, tunnelled conveyance route would be constructed for the recycled water to connect the new TTP in Mogden STW to the proposed outfall on the River Thames. The tunnel would be bored at a depth of around 20-30m for the majority of the route from Mogden STW to the site near Burnell Avenue. The final alignment and profile are to be determined following further surveys and detailed design. The tunnel route would be designed to sit within the mostly homogenous London Clay Formation geology. The tunnel route would have an internal diameter of approximately 3.5m and would be driven using a Tunnel Boring Machine (TBM) at a constant positive grade from the drive shaft at Mogden STW to the reception shaft to the south of Burnell Avenue. The connection from the river intake to the TLT is to be with a smaller diameter (up to 2.2m ID) pipe installed using a pipe jacking technique. There is a requirement for six shafts (see Table 2.1) to be constructed as part of the Project as set out below.

Table 2.1 Location and description of six shafts

Name	Location	Description
Drive shaft	Mogden STW Western Work Area	The TBM would be launched here, and all of the 3.5m ID conveyance route tunnelling excavated material would be removed from this shaft.
Interception shaft	Mogden STW Eastern Work Area	Provide the connection to convey recycled water from the new TTP to the new conveyance tunnel.
Intermediate shaft	Ham Playing Fields or Ham Street Car Park	An access shaft for health and safety, maintenance and ventilation during construction, and for inspection during operation for the recycled water conveyance tunnel.
Reception shaft	Burnell Avenue	The TBM would be removed from this shaft and it will connect to the discharge outfall via a pipe.
Connection shaft	Burnell Avenue	Connecting abstracted river water to the new river water conveyance pipeline.
TLT connection shaft	Northweald Lane or Tudor Drive	Connecting the new river water conveyance route to the TLT.

EIA Scoping Boundary

2.2.4 Figure 1.1 in Chapter 1 Introduction shows the EIA Scoping Boundary, general locality of the Project, LPA boundaries, above ground sites and location of the shafts, intake and outfall of the Project. The above ground sites of the Project include:

- Mogden STW (see Figure 2.2)
- Ham Lands (Ham Playing Fields and Ham Street Car Park (see Figure 2.3)
- Burnell Avenue (see Figure 2.4)
- Northweald Lane (see Figure 2.4)
- Tudor Drive (see Figure 2.4)

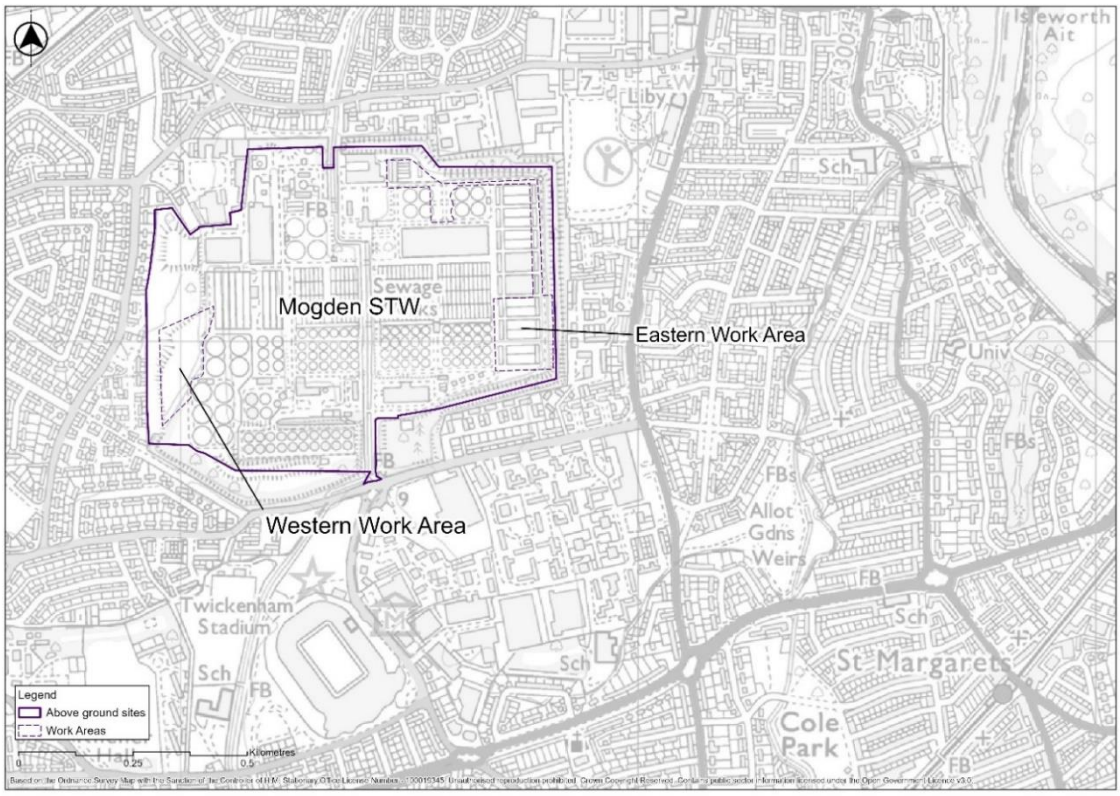


Figure 2.2 Mogden STW site

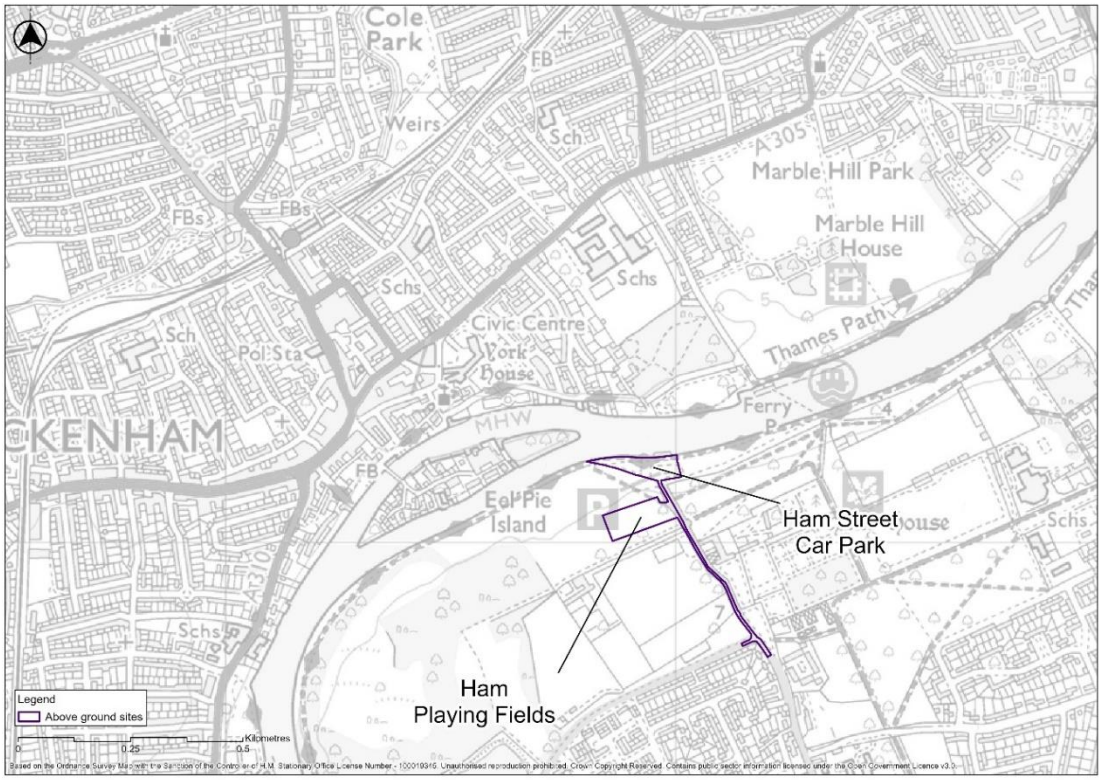


Figure 2.3 Ham Lands sites (Ham Playing Fields site and Ham Street Car Park site)

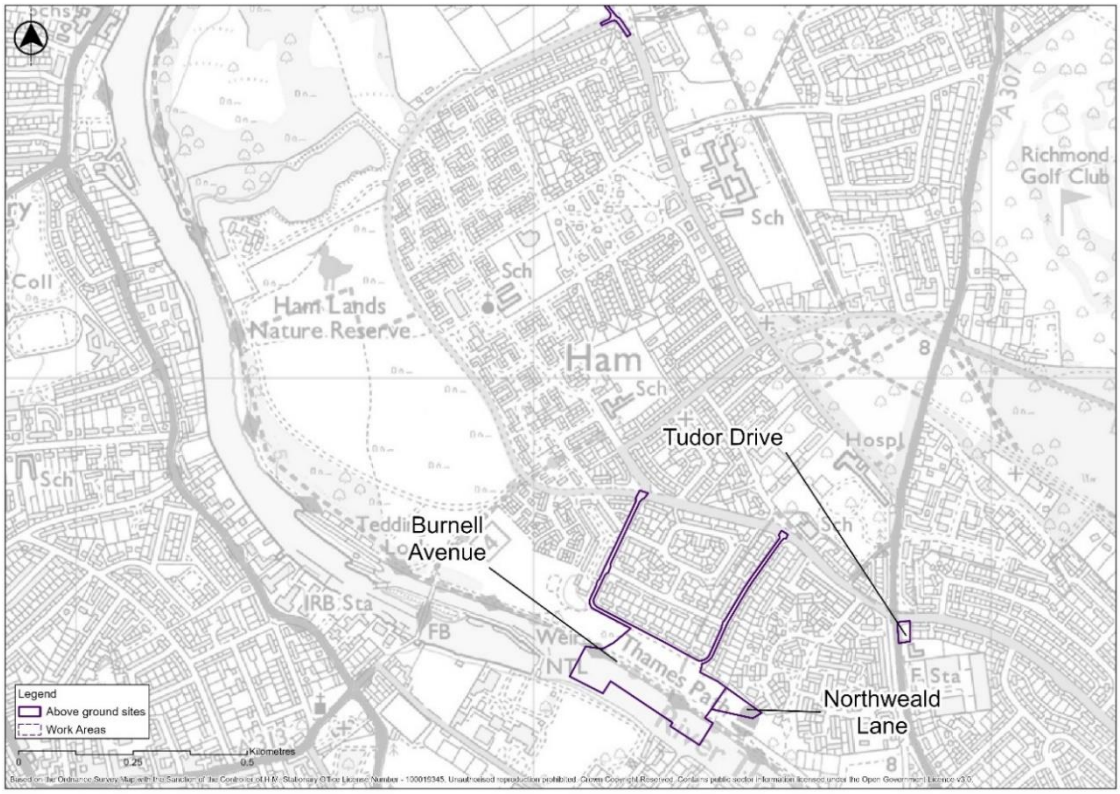


Figure 2.4 Burnell Avenue site, Northweald Lane site and Tudor site

2.2.5 The EIA Scoping Boundary includes Ham Street, Beaufort Road, Burnell Avenue and Dysart Avenue to ensure that any temporary or remedial works in the highway associated with vehicle movements are captured in the EIA.

2.2.6 Construction and operational phases would occur within the EIA Scoping Boundary. It should be noted that, at some locations, the EIA Scoping Boundary is larger than what may ultimately be required, particularly at Mogden STW and in the vicinity of Ham Lands. Works to utilities, diversions and upgrades considering our current understanding of these locations in relation to the Project are included within the EIA Scoping Boundary. As the design and EIA process progresses, the locations of compounds and temporary access routes would be refined. The EIA Scoping Boundary is considered sufficiently large enough to accommodate these refinements and allow flexibility as the design and assessment progresses.

The Project components and construction information

Mogden sewage treatment works: TTP and ancillary infrastructure

2.2.7 Mogden STW is an established Thames Water site surrounded by an embankment with vegetation and trees, except for the northwest corner of the site which comprises industrial and business land uses. The embankment is approximately 11m high to the east of the STW, with further vegetation including mature trees established on the crest. There are two main working areas within the Mogden STW site associated with this Project: the Western Work Area and the Eastern Work Area. See Figure 2.2 for the two work areas in Mogden STW.

2.2.8 Each work area would contain a suitably sized compound, or compounds, to facilitate construction. These would be expected to comprise:

- Project offices
- Welfare accommodation (e.g. canteen/mess/cleaning/stores/medical)
- Vehicle parking
- Circulation and access
- Materials storage (construction, excavation and wastes)
- Plant and equipment storage
- Power and utilities

2.2.9 Access to these areas would be from the southern entrance of the Mogden STW site, from the Mogden Lane/Whitton Dene roundabout and then through the site following existing internal roads.

Western Work Area

2.2.10 The Western Work Area is located on undeveloped land on the western side of Mogden STW, there is an embankment to the west of this area. The Western Work Area is proposed to site the drive shaft (c. 15.0m ID) for the TBM launch, and to provide the storage and laydown area for the

construction work proposed at this location. The TBM would be launched here, and the area would also be used for storing all of the tunnel excavated material. The materials required for the construction of the tunnel and some of the works proposed for the Eastern Work Area, including the TTP, recycled water interception shaft and associated ancillary infrastructure would also be stored in this area. This will include delivery and storage of all tunnel segments. During construction, crawler cranes, and potentially gantry cranes will be required to support the proposed works.

2.2.11 The only permanent development that would be left in situ will be the drive shaft and below ground connection tunnel route between the drive shaft and the recycled water interception shaft.

Eastern Work Area

2.2.12 The TTP is proposed to be located in the Eastern Work Area, on a newly constructed platform above some of the existing storm tanks in the south-eastern corner of the Mogden STW site. The maximum height of the TTP apparatus is estimated to be 15m above ground level within the STW. Permanent development to be constructed in this area would include:

- The recycled water interception shaft (c. 10.5m ID) which would provide the connection from the TTP to the recycled water conveyance tunnel
- The TTP
- An electrical building to support TTP operation
- An administration building
- A final effluent pumping station (for transfer of final effluent to TTP)
- Chemical storage tanks
- Associated ancillary infrastructure

2.2.13 During operation, the TTP would treat final effluent from the Mogden STW to produce an output of up to 75Ml/d of recycled water. This final effluent, which is wastewater that has been fully treated by the STW and is currently discharged into the receiving river environment at the existing outfall location within the Tideway. However, in order to discharge at Teddington in the freshwater River Thames, a higher water quality is required, and therefore further treatment in the new TTP is necessary.

2.2.14 The TTP process would include a moving bed biofilm reactor (MBBR) and mechanical filter treatment processes. Figure 2.5 below shows the high-level process flow diagram of the proposed TTP.

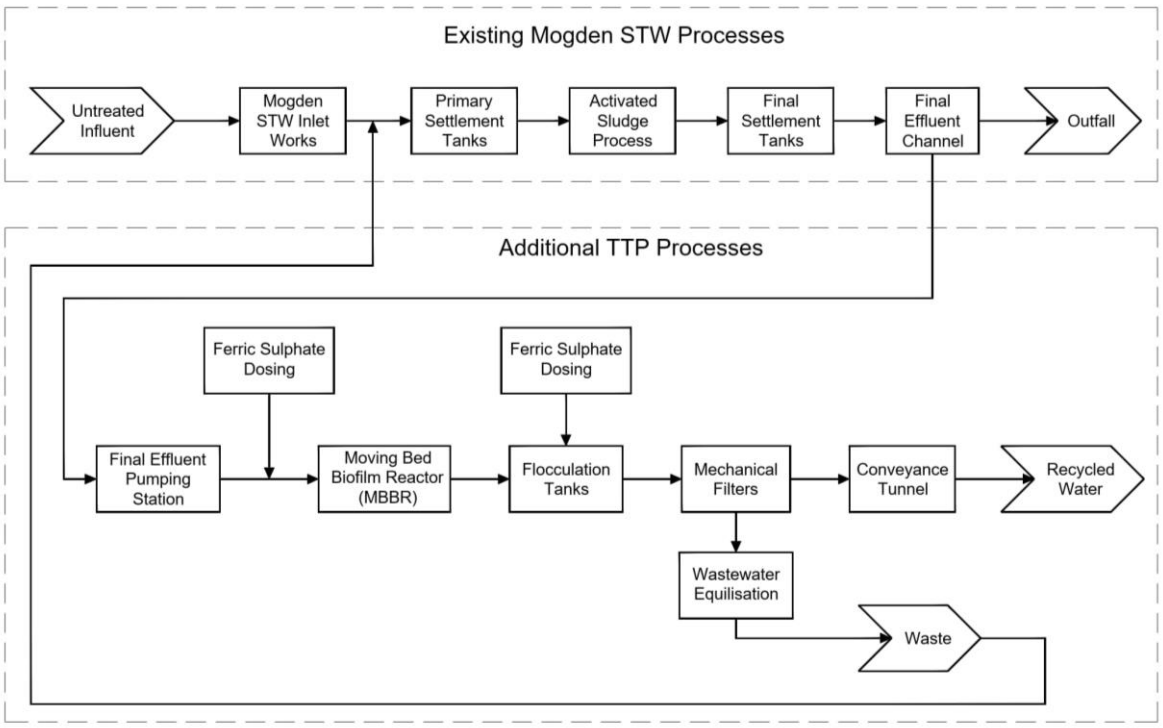


Figure 2.5 High-level process flow diagram of the proposed TTP in Mogden STW

2.2.15 New pipes would be connected to the existing final effluent culvert for abstraction of a portion of final effluent and its transfer to the new TTP. The TTP would also be connected by pipework to the recycled water interception shaft to facilitate conveyance of the recycled water produced by the TTP into the recycled water tunnel. This tunnel having started in the western work area and bored from west to east between drive shaft and interception shaft.

2.2.16 A wastewater return pipe, which transfers waste flow from the new TTP, would be connected to the Mogden STW as shown in Figure 2.5.

2.2.17 Construction materials for the TTP, interception shaft and associated ancillary infrastructure would be transferred from the Western Work Area using existing roads within Mogden STW. Any excavation material or arisings from the shaft construction in the Eastern Work Area would either be transferred to the Western Work Area or removed directly out of the southern part of Mogden STW site via the existing access. To facilitate safe handling, the construction works will be supported by appropriate works compounds.

2.2.18 The embankment in the Eastern Work Area of Mogden STW adjacent to the TTP and shaft site would need to be cut back from the existing site road and stabilised by retaining walls to create space for the TTP ancillary infrastructure and the interception shaft. This approach would ensure all temporary and permanent works are located within the existing Mogden STW footprint and retain the crest and external face of the existing

embankment. The design of the retaining walls would be informed by on-going ground investigation works.

2.2.19 During construction of the platform and the TTP, the Eastern Work Area would potentially be equipped with two temporary tower cranes to facilitate lifting. It is currently envisaged that these tower cranes would be up to 95m high. The location of the tower cranes is anticipated to be on the east and the southwest sides of the storm tanks, with this detail being confirmed through further design development. In addition, crawler cranes and potentially gantry cranes will be required to support the proposed works.

Recycled water conveyance tunnel and shafts

2.2.20 A new recycled water conveyance tunnel would be required between the new TTP and the proposed outfall upstream of Teddington Weir. The tunnel would be constructed from the Western Work Area within Mogden STW via a new c. 15.0m ID drive shaft. A c. 10.5m ID interception shaft and connection pipework to the TTP plant would be placed in the Eastern Work Area, within the Mogden STW site. The connection to the TTP would enable the conveyance of recycled water to the River Thames.

2.2.21 From the recycled water interception shaft site in Mogden STW, the tunnel would then head south, to an intermediate shaft (c. 10.5m ID) near Ham Lands and finally to a reception shaft (c. 12.5m ID) at Burnell Avenue.

2.2.22 Segmental lining would be used to construct the shafts using one of two methods, caisson jacking or underpinning, depending on the ground conditions. Once within the London Clay formation the construction methodology may switch to sprayed concrete lining. The proposed method will be confirmed in the Environmental Statement (ES). All shaft excavated material would be removed from the individual shaft sites by road.

2.2.23 The intermediate shaft near Ham Lands would serve as an access shaft during construction and a future inspection point for the conveyance tunnel during operation. The shaft is necessary to provide acceptable access spacing between Mogden STW and the reception shaft when undertaking future inspections and maintenance to ensure the health and safety of operatives.

2.2.24 There are currently two options for the intermediate shaft near Ham Lands, one at Ham Playing Fields and the other at Ham Street Car Park. The intermediate shaft would be located at only one of these two sites; however, part of the alternative site may still be utilised. A decision regarding which site is to be utilised for the construction and use of an intermediate shaft will be made ahead of statutory consultation and the publication of the Preliminary Environmental Information (PEI) Report.

2.2.25 Figure 2.6 provides an illustration of a typical drive shaft and compound area, such as that proposed in the western work area.

Figure 2.6 Typical plant and layout of a drive shaft

2.2.26 The TBM would be removed from the reception shaft located at Burnell Avenue (see Figure 2.7), but all tunnelling excavated material would be removed at Mogden STW. The recycled water conveyance tunnel is designed to sit within the London Clay band, the most suitable tunnelling medium and has been designed at a constant positive grade from Mogden STW to Burnell Avenue, so when not in use the conveyance route drains recycled water back to Mogden STW.

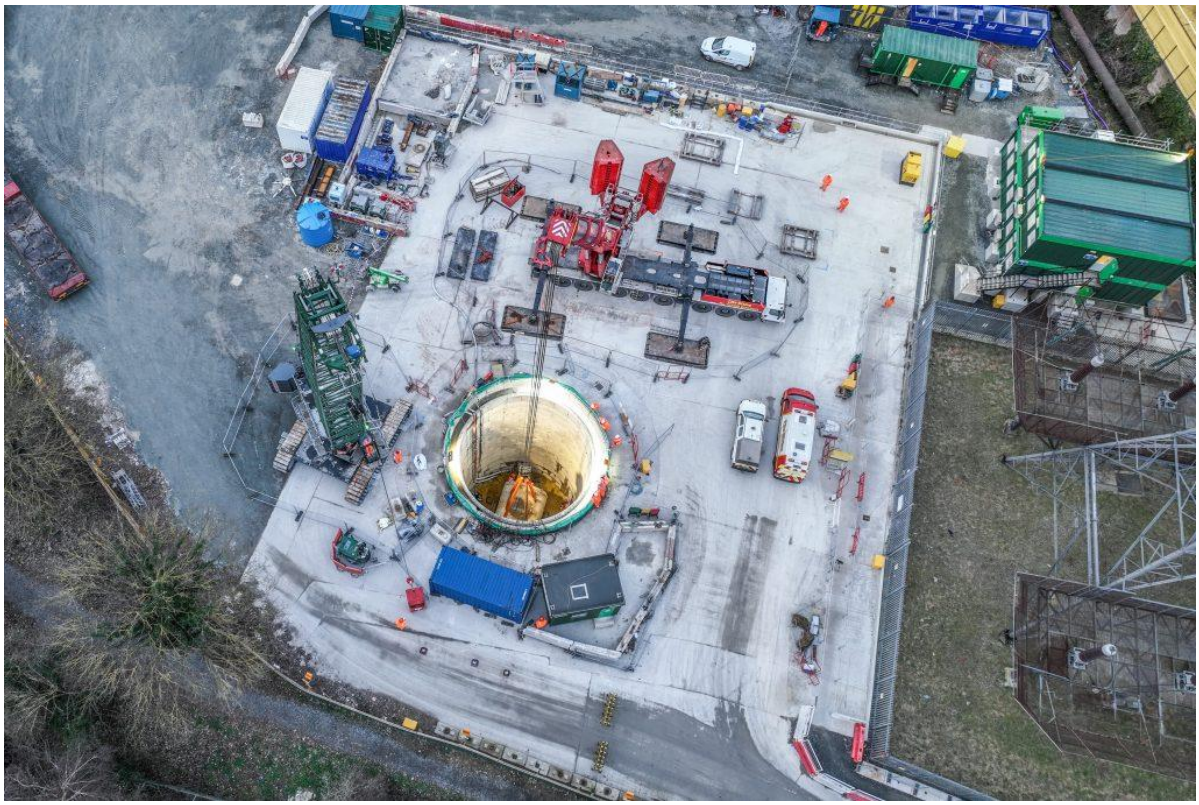


Figure 2.7 Typical plant and layout of a reception shaft

2.2.27 During operation of the Project, the recycled water from the TTP enters the recycled water conveyance tunnel through the interception shaft, the recycled water then flows to the reception shaft, into the outfall connection pipe before being discharged through the new outfall into the River Thames.

Outfall and intake

Outfall

2.2.28 Recycled water would be discharged via a new outfall into the River Thames approximately 150m upstream of Teddington Weir. Discussions with the Environment Agency are ongoing regarding the final specification of the outfall, with options for either a bankside discharge or an in-river discharge under consideration. The EIA Scoping Boundary reflects the potential for either option to be developed.

2.2.29 A bankside outfall structure, as shown indicatively in Figure 2.8, would be buried into the bank to minimise impacts on the landscape and recreational users, although access covers and covers to the control equipment would be required and would be fitted flush to ground level. The recycled water would be discharged into the River Thames at surface water level. The riverbank at the location of the discharge outfall would extend over the river edge as a vertical wharf. Vertical bars would be fitted under the wharf structure to prevent unauthorised access and to prevent accumulation of

debris when not in use. An internal weir would also form part of the design of a bankside outfall to prevent fish and eels from entering the conveyance tunnel beyond the outfall.

Figure 2.8 An indicative image showing a bankside outfall structure upstream of Teddington Weir

2.2.30 The in-river outfall option being considered would likely comprise a pipe buried along the riverbed rising to a screened outfall diffuser (see Figure 2.9 for the indicative in-river diffuser cross-section). The outfall structure would project upwards from the riverbed by up to 1.5m, leaving a minimum of 2.5m of water above the top of the outfall. This would reduce the potential for the outfall to be clogged by sediment when not in use and meet the navigational requirements of the Environment Agency. The outfall may also have one or multiple diffuser outlets. There may be a requirement to install fender piles around the outfall structure to mitigate against collision from river users/vessels; this will be finalised during design development.

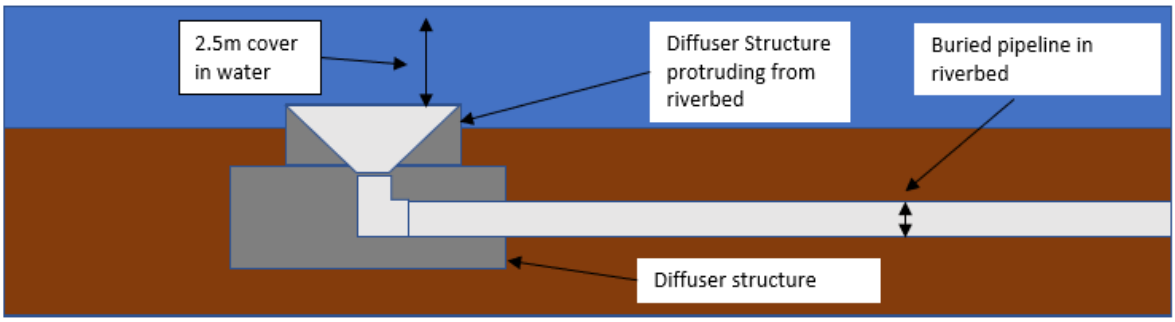


Figure 2.9 Indicative in-river diffuser cross-section

Intake

2.2.31 The river intake would be located approximately 150m upstream of the proposed new outfall. The proposed distance between the two structures has been established based on modelling work and through discussions with the Environment Agency, to ensure no risk of recirculation of discharged recycled water into the intake and to minimise the potential for reduced river flow between the intake and outfall. An indication of how an intake structure may look is provided in Figure 2.10.

Figure 2.10 An indicative image of an intake structure upstream of Teddington Weir

TLT connection

2.2.32 The final component of the Project will enable the transfer of abstracted river water into the existing TLT, which extends south to east across the River Thames. The existing TLT takes raw water from the River Thames at the Hampton intake to the Lockwood Pumping Station, part of Thames Water's Lee Valley reservoirs in North London.

2.2.33 The abstracted river flows would be conveyed from the intake structure into a raw water conveyance shaft (c. 10.5m ID). The abstracted river water would then gravitate from this connection shaft (c. 7.5m ID) to a further shaft (known as the TLT connection shaft) located near the existing TLT via a new river water pipeline (up to 2.2m ID). The abstraction into the pipeline would be controlled from the intake structure at an agreed and permitted flow rate, by valves which further control the water being released into the TLT. Connection to the TLT would be achieved via an adit or a vertical connection from the base of the new TLT connection shaft. A decision on the type of connection will likely be made before the PEI Report is published.

2.2.34 There are currently two potential locations for the construction of a new connection into the TLT, as listed below and shown in in Chapter 1 Introduction and Figure 2.4 in this chapter:

- Land to the south of Northweald Lane in close proximity to the intake site, identified as the Northweald Lane site
- A site located to the northeast of the intake site at the junction of Duke's Avenue, Richmond Road/Upper Ham Road (A307) and Tudor Drive, identified as the Tudor Drive site

2.2.35 A decision on the location of the connection into the TLT will likely be made before the PEI Report is published.

2.2.36 The river water pipeline to link the raw water connection shaft to the Tudor Drive TLT connection shaft would differ depending on the selected connection. The connection to the TLT shaft to the south of Northweald Lane may be installed using trenched pipelines. The connection to the existing TLT at Tudor Drive would be using a pipe-jack construction methodology.

2.2.37 Similar to the shafts associated with the recycled water conveyance tunnel, the intake connection shaft and TLT connection shaft would be constructed using either the underpinning or caisson shaft sinking techniques.

Construction programme, working hours and work force

2.2.38 Construction of the Project is expected to take approximately three years commencing in 2029 and completing in winter 2031. The Project would not be in operation immediately after construction, there would be a period of approximately a year and a half of commission and performance testing with the Project coming into operation in 2033. See Table 2.2 for the indicative construction programme.

Table 2.2 Indicative construction programme

Activity	2029				2030				2031				2032				2033			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
TTP and ancillary infrastructure at Mogden STW																				
Recycled water conveyance tunnel from Mogden STW to Burnell Avenue																				
Outfall: discharge to River Thames at Burnell Avenue																				
Intake: abstraction from the River Thames at Burnell Avenue																				
TLT connection works																				
Commissioning and performance testing																				
Water available for use																				
Full operations																				

2.2.39 Construction works would be programmed, where practicable, to adhere to standard working hours of 7am to 7pm. Working hours at the Western Work Area within Mogden STW would however need to be 24-hours, seven days a week during the tunnelling stage. Other construction activities may also require working hours which fall outside of the abovementioned standard working hours and would require adjustment through agreement with the relevant local authority.

2.2.40 Approximately 130 workers are anticipated daily at Mogden STW, 100 at Burnell Avenue, 50 at Ham Steet and 30 at Tudor Drive are anticipated during the construction phase at any given time.

2.3 Operation and Maintenance

Mogden sewage treatment works: TTP and ancillary infrastructure

2.3.1 During times when the Project is not required to operate (see paragraph 2.2.1 for the typical operating period) there will be a requirement to continue to run the TTP at reduced levels to maintain the operability of the TTP. The TTP would operate at 15Ml/d to maintain biomass within the moving bed biofilm reactor (MBBRs). The recycled water produced during this period will be added to the final effluent channel and discharged at Isleworth Ait which is the current discharge point for the Mogden STW. During this period, the recycled water conveyance tunnel will be kept dry; recycled water in the conveyance tunnel will be pumped and returned back into the STW processes.

2.3.2 The TTP would likely run at maximum capacity during its operating period. Mogden STW final effluent would be abstracted from the existing final effluent culvert by the proposed pumping station to generate up to 75Ml/d of recycled water. Recycled water (75Ml/d) would be discharged into the recycled water tunnel for transfer to the River Thames.

Recycled water tunnel and shafts

2.3.3 During the operating period of the Project (see paragraph 2.2.1 for the typical operating period), the recycled water conveyance tunnel from Mogden STW to the outfall would operate with the shafts at either end acting as balancing tanks. Water will be pumped into the interception shaft at the TTP in Mogden STW and pumps at the reception shaft at Burnell Avenue will draw water out at the other end of the conveyance tunnel. A single networked control system will simultaneously control the pumps at the two shafts to maintain water levels within a controlled range to suit the pumps and to provide the driving head to push the water along the short outfall connection pipe.

2.3.4 Depending on the final design, which would be confirmed by ground investigations and further hydraulic analysis, the Project is looking to eliminate these pumps from the design and control the flow by hydraulic head and flow control valves/regulators. This involves recycled water entering the recycled water tunnel and filling it to a low pressure which allows flows to be pushed through to the outfall. This approach would require the intermediate shaft to be sealed.

2.3.5 Once construction of the recycled water tunnel is complete the shafts would be capped with a concrete cover with access hatches for future maintenance, similar to that shown in Figure 2.11.

2.3.6 The pumps will need regular maintenance and periodic operation to keep parts operable. The pumps will be run on regular cycles to keep the impellers and bearings operable regardless of the operating pattern of the Project.

2.3.7 During maintenance periodic inspections, approximately every 5-10 years, would be undertaken requiring access to all of the shafts. This would be to undertake condition surveys and to clear out of any settled materials or organic matter. Modern tunnels experience very little groundwater ingress, therefore the recycled water tunnel can remain drained during times when the Project is not required to operate with minimal risk.

Figure 2.11 Typical shaft access hatch after completion

Outfall, intake and TLT connection

2.3.8 The outfall and the river intake screen on the abstraction structure would be visited once a week by operations staff to visually check the condition of all structures. In the event of a security alert, staff would visit site to confirm any damage. Periodic maintenance of screens and mechanical equipment is required. Onsite maintenance would occur once a year on average.

2.3.9 The abstraction of raw water from the intake to the TLT would be controlled from the intake structure by valves. There will be an inline flowmeter and control interfaces with the discharge flow meter to manage abstraction to match the discharge.

2.3.10 The valves would isolate preventing raw water intake and recycled water discharge in the event of telemetry notification of quality issues. Further detail on control of pacing the abstraction to match the discharge will be developed during the following design stages.

2.3.11 The abstraction will only take place when meeting the required trigger levels, of when river levels are low and allowable abstraction rates are insufficient to maintain water levels in London's storage reservoirs, as will be set out in the abstraction licence.

2.4 Transport

Rail

2.4.1 A review of multi-modal options for transportation was conducted. It was determined that direct rail freight is scoped out of the EIA due to the absence of suitable railway lines within the site's local vicinity. Nonetheless, the use of railheads for the import of construction materials is scoped in for consideration to source materials for last-mile deliveries via Heavy Goods Vehicles (HGVs).

2.4.2 The feasibility of using goods suppliers that utilise railhead facilities will be considered in accessible locations, including:

- London Concrete – Transport Avenue, Brentford (for the Mogden STW site, via Mogden Lane, A310 Twickenham Road, B454 Spur Road, B454 Syon Lane, and A4 Great West Road)
- Day Aggregates – Kingston Road, Tolworth (via A307 south, A243 Brighton Road, and A3 Kingston Bypass)

2.4.3 These examples may be favoured given they are the nearest suppliers accessible directly from the London Lorry Control Scheme (LLCS) Permitted Routes.

2.4.4 Rail has been scoped in for the movement of the construction workers between their places of residence and the construction sites. Journey times

between the nearest railway stations and the sites have been identified in section 18.4 of Chapter 18 Traffic and Transport along with cycling journey times. This includes car journey times to allow the feasibility of shuttle bus routes between stations to be considered.

River

2.4.5 The use of barges and river freight has been considered and will continue to be as the Project develops. For construction north of the river, i.e. at Mogden STW site, due to lack of direct access to the river it is acknowledged this would require additional handling and road movements to suitable and established river front locations.

2.4.6 The use of barges has been investigated for the delivery of precast segments and for removing excavated materials to the Ham Playing Fields/Ham Street Car Park (intermediate shaft) and onward to the sites south of the river. Any benefits are unlikely to offset the additional construction activities, costs, programme extension and environmental effects that would likely arise through the installation of new river freight load out facility, given the spoil generated at the intermediate shaft site being limited to the shaft construction. For the works area upstream of the Teddington Weir (Burnell Avenue site for the intake, outfall and reception shaft) there is greater potential for this application due to the need to already have works within the water i.e. cofferdams.

Roads

2.4.7 Routes have been developed for construction vehicle traffic to access the proposed above ground sites from the strategic road network (SRN), namely from the M25 as it is an interregional pathway to access material suppliers from across the country. These routes aim to utilise the Permitted Routes as identified in the LLCS. The Transport for London Road Network (TLRN) intersects and shares most of the LLCS Permitted Routes between the sites and the SRN, namely the A316 and A3 corridors. These were segmented into sections and baseline traffic flows were extracted from key Department for Transport counter points located on these sections. HGV movements are restricted where sections of construction routes within Greater London fall outside of the Permitted Routes. The restricted hours are Monday to Friday from 21:00-07:00 including bank holidays, and Saturday 13:00-Monday 07:00. Unless permission is obtained from London Councils when registered to the LLCS, HGVs are prohibited from using these sections during these hours.

2.4.8 Each above ground site would have a potential route coming in from motorways and accessing the site through residential areas. These routes would be used by HGVs which would typically be delivering materials for the

construction of the TTP and associated ancillary infrastructure, shafts and tunnel concrete segments as well as removing excavated waste generated from the site compounds.

2.4.9 Construction workforce travel will include journeys to the sites via cars and Light Goods Vehicles (LGVs). However, a Construction Logistics Plan will be produced ahead of construction starting. This will aim to reduce the number of commuting vehicle trips by promoting the use of sustainable modes and encouraging lift-sharing.

2.4.10 Abnormal Indivisible Loads (AILs) will be required for transport of large plant and equipment to and from the sites. The components of a TBM would be delivered to the Mogden STW for assembly on site, while the TBM would be disassembled on the Burnell Avenue site and transported offsite. This would comprise several AILs as well as any other large plant and equipment required for construction.

2.4.11 The dimensions and weights of vehicles used on British roads are regulated by the Road Vehicles (Construction and Use) Regulations 1986 (C and U) Regulations and the Road Vehicles (Authorised Weight) Regulations 1998 (AW) Regulations.

2.4.12 Special types vehicles are those which don't meet the C and U and AW Regulations but can be used outside these rules under the authority of the Road Vehicles (Authorisation of Special Types) (General) Order 2003 (STGO).

2.4.13 For these vehicles, the STGO process would be followed which could require different notice periods depending on the type of vehicle. The contractor would use the Electronic Service Delivery for Abnormal Loads (ESDAL) to notify the police, road, and bridge authorities along the entire route from origin to destination.

2.4.14 Furthermore, a "tracking" assessment is likely to be required to determine whether the abnormal vehicle can successfully negotiate the route from the origin to the destination. This is likely to include the "last mile" to site and "first mile" from site. This would include any height restrictions.

Mogden STW site

2.4.15 Access from the public highway network is obtained to the construction sites within Mogden STW (Western Work Area and Eastern Work Area) via the unnamed road, which is the northern arm of the roundabout which meets with Mogden Lane, Rugby Road, and Whitton Dene.

2.4.16 There are two route options for HGVs travelling from this access point to A316 Chertsey Road, the nearest LLCS Permitted Route:

- South via Rugby Road and B361 Whitton Road or
- East via Mogden Lane and then south via A310 Twickenham Road and A310 London Road

2.4.17 Thereafter, it is likely that vehicles will travel west along the A316 corridor to meet the M3, where the SRN starts. There is the possibility that some construction materials may be imported from the Brentford railhead using the A310 Twickenham Road.

Ham Lands sites

2.4.18 For Ham Lands sites (Ham Playing Fields and/or Ham Street Car Park), access is obtained from the public highway network from the north of Ham Street. For HGVs travelling from the access point, the A307 corridor could be used to access the nearest LLCS Permitted Routes. Access can be obtained to this corridor via the following options:

- Ham Street and Sandy Lane or
- Riverside Drive and Dukes Avenue

Burnell Avenue, Northweald Lane and Tudor Drive sites

2.4.19 The Burnell Avenue and Northweald Lane sites would both be accessed from the public highway network on the eastern end of Burnell Avenue. The Tudor Drive site would be accessed from either A307 Richmond Road at its west side, or Tudor Drive at its north side.

2.4.20 HGVs travelling to the Burnell Avenue, Northweald Lane and Tudor Drive sites would use Dukes Avenue from the A307 corridor and thereafter be routed along Dysart Avenue, Burnell Avenue and Beaufort Road in a gyratory manner.

2.4.21 From the A307 corridor, there are two routing options that are being considered to access the LLCS Permitted Routes for the SRN:

- A307 going north of the river via Richmond to meet A316 Chertsey Road (LLCS Permitted Route), and thereafter the M3 (SRN) or
- A307 south of the river via Royal Borough of Kingston upon Thames to meet A243 Brighton Road (LLCS Permitted Route) and thereafter the A3 (SRN)

2.4.22 These main routing options are summarised in Figure 2.12.

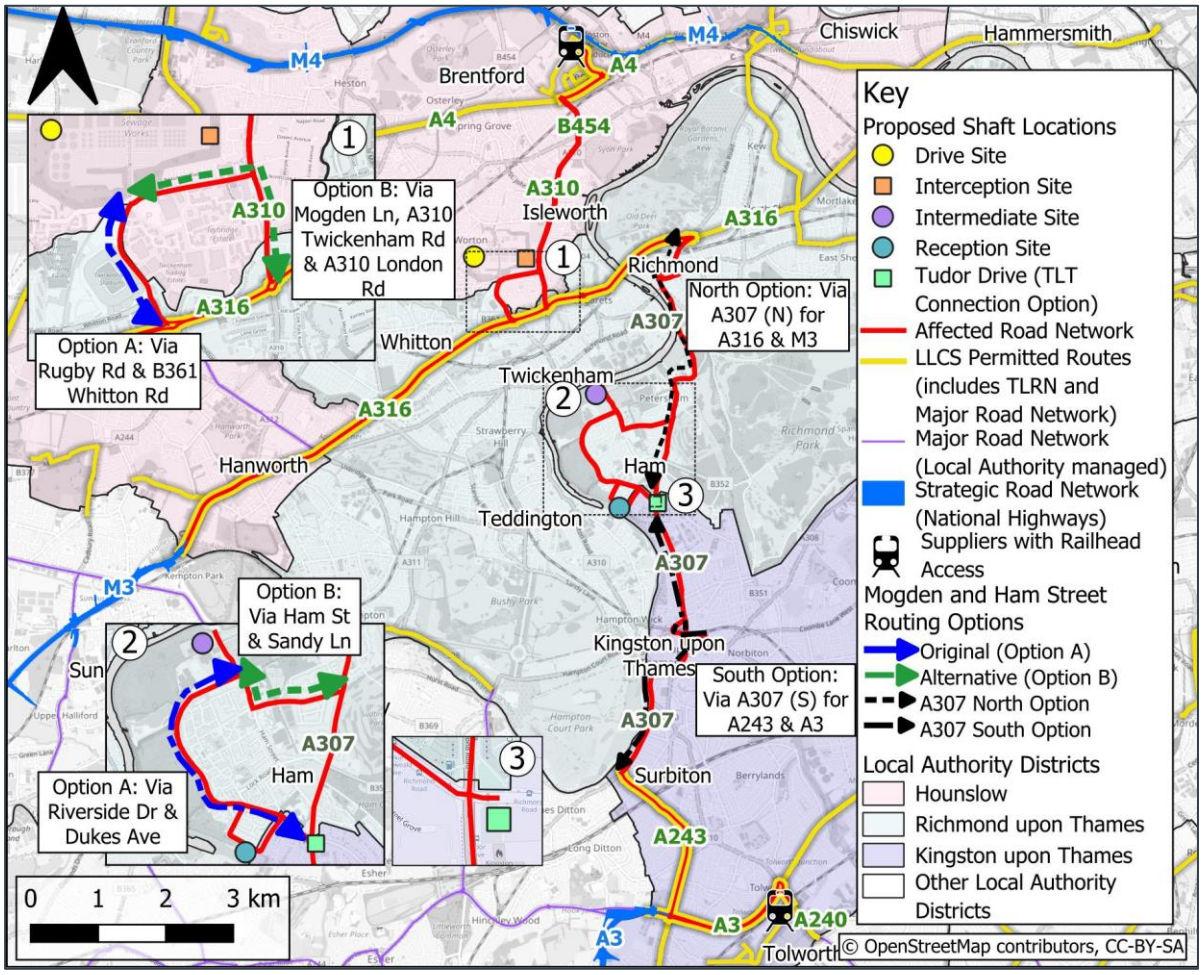


Figure 2.12 Overview of HGV routes from construction sites to the SRN (A3 and M3 for the M25)

2.4.23 The final routes would be determined in consultation with key stakeholders including the local councils and outlined in the Traffic and Transport chapter of the ES as part of the Development Consent Order application. The contractor will be expected to implement these routes and monitor the compliance of HGVs. The level of HGV and LGV movements required for the operation and maintenance of the facilities has been investigated and considered to be negligible, with further details provided in Chapter 18 Traffic and Transport. For operating the TTP at Mogden STW, one delivery of chemicals will be required per week by an HGV tanker during the operational period. It is worth noting that additional dosing of chemicals is not anticipated to be required whilst the TTP is in maintenance mode. The conveyance route shafts across the project will require minimal maintenance and the tunnel will require inspection approximately every five to 10 years. Burnell Avenue site's on-site maintenance is expected to require a weekly visit by Thames Water staff typically using a small van (LGV). The Burnell Avenue site will require an annual inspection across a couple of days involving two or three Thames Water staff utilising small vans (LGVs).

2.4.24 An analysis of bus routes along the final construction routes would be conducted and assessed in Chapter 18 Traffic and Transport to determine the level of impact on bus routes.

3 Design Evolution

3.1 Introduction

3.1.1 Planning Inspectorate's Advice Note Seven[15] requires the environmental impact assessment (EIA) Scoping Report to outline the reasonable alternatives considered and the reasons for selecting the preferred option. The Project is the result of iterations in scheme design including conveyance routing, outfall location and design of the new tertiary treatment plant (TTP) to be constructed at Mogden sewage treatment works (STW).

3.2 Development of the Project

3.2.1 This section provides an overview of the approach taken for the emerging scheme design of the Project. As the Project comprises component parts that, when working together, comprise an operational water recycling scheme. The Project has been split into the following aspects;

- Development of the design of the TTP at Mogden STW
- Refinement of the recycled water conveyance route between the TTP and the outfall into the River Thames
- Identification of a suitable locations for the intake and outfall
- Identification of a suitable location for the intake's connection to the Thames Lee Tunnel (TLT) and TLT conveyance route

3.2.2 The Teddington Direct River Abstraction (DRA) project (the 'Project') was originally proposed as part of the draft Water Resource Management Plan 2019 (dWRMP19) at a size of 300 Mega-litres per day (Ml/d).

3.2.3 Following consultation on the dWRMP19, a Statement of Common Understanding between Thames Water and the Environment Agency was published stating that Water Framework Directive (WFD) compliance of a 300Ml/d Teddington DRA scheme was uncertain primarily due to potential temperature impacts and therefore the scheme was not environmentally promotable at that time. In the Statement, Thames Water committed to undertake further research into the sensitivity of the Lower Thames ecosystem to smaller DRA discharges and viable mitigation approaches.

3.2.4 As part of the Regulators' Alliance for Progressing Infrastructure Development (RAPID) Strategic Resource Option (SRO) Gate 1 work and taking account of the dWRMP19 findings and the Statement of Common Understanding, the London Water Recycling SRO has assessed a Teddington DRA scheme in size increments of 50Ml/d and 75Ml/d up to a largest size of 150Ml/d. Based on further work completed and reported at Gate 2 in November 2022[16], Thames Water investigated and rejected options greater than 100Ml/d due to the continued potential risk of not complying with WFD objectives and Environment Agency guidance.

3.2.5 At the end of 2022, Thames Water issued its draft Water Resource Management Plan 2024 (dWRMP24) for consultation which included Teddington DRA at 75Ml/d.

3.2.6 Thames Water's WRMP24 was approved on the 4 September 2024 by the Secretary of State for Defra. On reaching the decision to approve Thames Water's plan, the Secretary of State concluded that there is a strategic need for major projects including this Project.

TTP

3.2.7 The TTP utilises a portion of the final effluent from Mogden STW; to minimise off-site development, the location of the TTP must remain within the operational site boundary. Furthermore, development of the TTP close to the current final effluent channel, a portion of which will be used in the TTP, reduces the amount of infrastructure required to develop the Project. However, the Mogden STW site is highly developed with limited available land. The development proposed locates the TTP close to the existing final effluent channel and involves modifying some of the existing storm tanks to free up space for the TTP development. The footprint of some of the existing storm tanks is adequate to accommodate, on a platform above the storm tanks, a TTP with a capacity of 75Ml/d.

Recycled water conveyance route

3.2.8 The recycled water conveyance route is required to transfer the recycled water from the TTP to the discharge outfall on the River Thames.

3.2.9 The design of the recycled water conveyance route has evolved during the design and assessment process. The design for the recycled water conveyance route proposed in autumn 2023 when Non-Statutory Consultation on the Project was undertaken, was based on a conveyance route constructed using a pipejacking construction method. This design of the recycled water conveyance route was developed with regard to the following parameters:

- The conveyance would need an internal diameter (ID) of at least 1.8m
- The spacing of intermediate shafts would be limited by operational, health and safety considerations governed by the diameter and construction techniques. A maximum safe distance of 1km was assumed between shafts based on industry good practice[17]
- Based on the requirements to drive a 1.8m ID recycled water conveyance route using a pipejacking construction method the drive shaft would be required to be 10.5m in diameter with a construction site area of approximately 2,500m^2

3.2.10 On the basis of these parameters the conveyance route proposed in autumn 2023 when Non-Statutory Consultation on the Project was undertaken

comprised five intermediate shaft sites and associated construction compounds between Mogden STW and the outfall location near Burnell Avenue. Further details on the process of shaft site identification and assessment was provided during the Non Statutory Consultation process[18].

3.2.11 Following the Non-Statutory Consultation in autumn 2023, assessments of alternative tunnel diameters and construction techniques have been undertaken seeking to address some concerns raised with the proposed pipejacked recycled water conveyance route. As a result of this work key aspects of the recycled water conveyance route have been redesigned, including:

- Constructing a 3.5m ID recycled water conveyance route between Mogden STW and the outfall at Burnell Avenue rather than the 1.8m ID conveyance route previously consulted upon
- Construction of the recycled water conveyance route using a Tunnel Boring Machine (TBM) rather than by way of pipejacking, with all the tunnel excavated material being transferred to Mogden STW rather than being removed from each of the shaft sites
- A reduction in the overall length of the recycled water conveyance route
- A reduction in the number of intermediate shafts from five to one

3.2.12 The design of the proposed recycled water conveyance route has been amended in light of feedback received during the Non-Statutory Consultation in autumn 2023 and proposes a shorter route with fewer intermediate shafts and above ground sites.

3.2.13 The recycled water tunnel route that forms part of the Project starts at the Mogden STW site. It exits the Mogden STW site in the south eastern corner close to the proposed TTP plant and follows a route curving and heading in a southerly direction under the tidal River Thames (Tideway) towards Ham and then in a south-westerly direction to the terminus at Burnell Avenue and the River Thames just upstream of the Teddington Weir.

Intake and outfall location and TLT connection

3.2.14 An essential provision of the Project is its ability to connect with the TLT to take river water to the Lee Valley reservoirs. A key driver in achieving this provision is to ensure that the amount of construction associated with the connection between abstraction and the TLT is minimised and also reduce the associated land use and environmental impacts. Accordingly, the location of the intake and connection sites to the TLT has been determined by the location of both the freshwater River Thames and the TLT.

3.2.15 The location of the intake, being on the freshwater River Thames and as close as practicable to its recipient asset, the TLT close to where the TLT crosses the River Thames at Teddington was determined with details on this process set out in the Non Statutory Consultation material presented in

autumn 2023[19]. This intake location was identified as being on the south bank of the River Thames adjacent to open space at Burnell Avenue approximately 350m upstream of Teddington Weir.

3.2.16 The abstraction of raw water at the intake will remove water from within the river channel above Teddington Weir. In order to ensure overall volumes in this general stretch of the river are maintained to required levels during drought conditions it is necessary to ensure that the discharge enters the river above Teddington Weir.

3.2.17 A further key provision for the Project is to achieve a degree of separation between the outfall and the intake points whilst still ensuring both are located in close general proximity to achieve the necessary balance in water levels at the site of abstraction.

3.2.18 The proposed location for the outfall for the recycled water from Mogden STW has been subject to a number of design changes. An initial design for the outfall was for this to be positioned on the opposite (north) bank of the River Thames within the grounds of The Lensbury, approximately 200m upstream of Teddington Weir.

3.2.19 With sufficient space identified at the Burnell Avenue site to accommodate both the discharge infrastructure and the abstraction infrastructure, including their construction and operational requirements, and recognising the maturity and density of tree growth along The Lensbury's river bank, and the presence of greater stretches of lighter vegetation on the Burnell Avenue south bank, the Burnell Avenue site was subsequently selected for the outfall location. Locating the outfall on the south bank of the River Thames also enables a single construction area to be developed and avoids a further tunnel crossing of the River Thames.

3.2.20 There are two potential connection locations into the TLT, these representing location on open land, above the existing TLT and in proximity to the intake. Both these potential locations, namely south of Northweald Lane and Tudor Drive, are being considered with a decision on the location of the connection into the TLT likely to be made before the Preliminary Environmental Information (PEI) Report is published.

3.3 Embedded Mitigation

3.3.1 During the design of the Project, environmental impacts have been considered and where possible embedded mitigation used to 'design-out' potential effects. These embedded mitigations are summarised in Table 3.1. Following the scoping phase, the EIA will capture further design developments. As part of assessing the likely significant effects, the EIA will identify any additional design measures to reduce these effects. The additional mitigation measures identified by the EIA will be incorporated into the PEI Report/Environmental Statement.

Table 3.1 Summary of proposed embedded mitigation measures

Component	Embedded mitigation measures
TTP	Use of press-in piling method for sheet piling along embankment to minimise noise and vibration.
	Containment would be installed around chemical storage tanks for ferric sulphate to prevent spills.
Shafts	Permanent concrete shaft caps would be positioned below the ground surface to minimise impacts on current use of the land with replanting to match the existing site. Access covers measuring approximately 2mx2m would be required for shaft entry and egress.
Ancillary infrastructure at intake	Pumps and infrastructure to be buried below ground where possible to minimise visual impact and reduce noise.
Intake and outfall	Sheet pile wall for cofferdam to be installed by a press-in method to minimise noise and vibration.
Outfall	Direction of outfall if bankside to be 45˚ from the perpendicular of the riverbank to mitigate disturbance of river flow. Majority of bankside outfall structure to be buried in river bank to minimise visual impact and requirement to divert footpath.

3.4 Do-nothing Scenario

3.4.1 A 'do-nothing' scenario would not take forward any benefits associated with the need of the Project as described under section 1.5 Context of the Project in Chapter 1 Introduction. Failure to provide the Project will place businesses and the growing population of London under very significant risk of water shortage when the weather is dry. The south east is identified as an area of significant economic growth, and with London recognised as being both water stressed and one of the driest areas of the UK, there is a need to have effective, integrated and resilient water infrastructure that is fit for purpose to meet the constant needs of a growing population.

3.4.2 With population set to grow in the Thames Water catchment from over 10 million people today to 12 million by 2050[20], and with a forecast reduction in the amount of water available based on current sources of approximately 120Ml/d, if Thames Water does not ensure that there is sufficient supply in its network when the weather is dry, the needs of existing communities and economic activities will not be sustained.

4 Consultation and Engagement

4.1 Introduction

4.1.1 This chapter sets out the approach to consultation and engagement with statutory authorities and other relevant stakeholders primarily in relation to Environmental Impact Assessment (EIA) scoping. Consultation is a formal process seeking formal feedback on the Project, whereas engagement is a more informal provision of information and informal discussion. A summary of consultation and engagement already undertaken will be outlined with respect to potential environmental effects of the Project in this chapter. Further detail is provided in each technical aspect chapter (Chapters 6 to 20).

4.2 Engagement Process for the Project

4.2.1 To date, Project engagement and consultation has been undertaken as part of the Water Resources South East (WRSE) regional plan and the draft Water Resources Management Plan (dWRMP24), and through the Regulators' Alliance for Progressing Infrastructure Development (RAPID)[21] gated report submissions to Ofwat, the Environment Agency and the Drinking Water Inspectorate.

4.2.2 Engagement with the National Appraisal Unit (NAU), Environment Agency and Natural England at RAPID Gate 1 (2020) was undertaken primarily to inform the requirements for the water resources and aquatic ecology assessments in the early stages of understanding key risks. Technical Working Groups (TWGs) were set up with the NAU, Environment Agency, Natural England, Historic England and the Port of London Authority where scopes of work were developed, methodological approaches agreed and outputs on critical topics shared. Over 50 technical workshops were held since 2021 covering the following areas of interest:

- Engineering design
- Terrestrial ecology and Biodiversity Net Gain
- Fisheries
- Water quality
- Aquatic modelling
- Aquatic ecology
- Regulatory assessments
- Temperature
- Navigation
- Historic environment

4.2.3 Engagement with these organisations and use of TWGs have remained as the Project has moved into the RAPID Gate 3 process.

4.3 Draft Water Resource Management Plan 2024 consultation

4.3.1 The draft Water Resource Management Plan 2024 (dWRMP24) was consulted on from 13 December 2022 to 21 March 2023, seeking feedback from customers, stakeholders and regulators on the proposals. This included identifying the Project as a best value option within the plan.

4.3.2 Five public events were held close to the proposed locations for the new water resource schemes included in the Thames Water dWRMP24. For the Project these locations were in Richmond and Twickenham, which were attended by 633 people. A webinar was also held focusing on the Project, which was attended by 213 people.

4.3.3 The consultation received 1,687 responses from a wide range of local, regional and national stakeholders. An independent consultancy worked with Thames Water to log, code, and analyse the comments received to the consultation.

4.4 Autumn 2023 Non-Statutory Public Consultation

4.4.1 Thames Water undertook a Non-Statutory Public Consultation from 17 October 2023 to 11 December 2023 to seek feedback about the site options appraisal for shafts and infrastructure associated with the Project, as well as feedback on the conveyance route alignment. Thames Water sought to collect feedback from a variety of people such as landowners, residents, businesses, local authorities and other statutory bodies who might be affected by or interested in the Project to help develop the proposals.

4.4.2 During the consultation, four public events were held. The locations, dates, and attendance are detailed in the Table 4.1 below.

Table 4.1 Overview of autumn 2023 Non-Statutory Consultation events

Date	Location	Attendance
3 November 2023, 2-8pm	York House	205
9 November 2023, 2-8pm	Peter and Paul Centre	125
13 November 2023, 2-8pm	Twickenham Stadium	83
20 November 2023, 2-8pm	YMCA Hawker	330

4.4.3 Local Members of Parliament and senior leaders from local authorities were invited to attend. Here they were given an opportunity to familiarise themselves with the consultation materials as well as the chance to speak with members of Thames Water.

4.4.4 The consultation received 2,312 responses from stakeholders and members of the public. An independent consultancy logged, coded and analyse the feedback, before passing to the Project team to review and consider responses.

4.5 Local Planning Authority Engagement

4.5.1 In summer 2024, the relevant local planning authorities for the Project - London Borough of Hounslow, London Borough of Richmond upon Thames, and Royal Borough of Kingston upon Thames - were briefed during a series of engagement meetings. These meetings outlined the Project, its significance within the Water Resources Management Plan (WRMP), and the ongoing efforts to explore its potential delivery. Issues discussed during those briefings included construction impacts, permanent design of above ground infrastructure, construction within open space and Metropolitan Open Land, works at Mogden sewage treatment works (STW), community engagement and the role of the local labour market.

4.5.2 As work on the Project has progressed a series of pre-application meetings have been held jointly between the Applicant and the three local planning authorities, covering:

- Project introductions and updates
- Approaches to ecological assessment
- Design updates
- Establishing and providing feedback on technical subject specific meetings
- A series of nine technical subject specific meetings to inform issues of importance to the EIA Scoping process

4.6 Next Steps

4.6.1 Engagement continues with the stakeholders and local community as part of the RAPID gated process, the Development Consent Order process and general sharing of information. Local authorities, other stakeholders and the wider public will be consulted on the Project and alternatives considered during the Statutory Consultation for the Project, which is anticipated to be carried out in spring 2025.

4.6.2 Planning Inspectorate will seek advice from statutory consultees in relation to preparing its scoping opinion based upon this EIA Scoping Report. Throughout the EIA process the Applicant will continue to engage with

statutory and non-statutory consultees on the progress of the EIA and its findings.

4.6.3 Matters of detail on the scope of the EIA will continue to evolve as surveys and assessments are undertaken, which may identify new issues or information suggesting that certain effects are unlikely to be significant. The publication of the Preliminary Environmental Information (PEI) Report expected in 2025 will also be consulted on as part of the Statutory Consultation for the Project. Ahead of Statutory Consultation the Applicant will produce a Statement of Community Consultation (SoCC).

5 EIA Methodology

5.1 Introduction

5.1.1 The purpose of the Environmental Impact Assessment (EIA) is to protect the environment by ensuring that decision makers when deciding whether to grant consent for a project, which is likely to have significant effects on the environment, do so in the full knowledge of the likely effects and take this into account in the decision-making process[22].

5.1.2 The EIA process is defined as '*a systematic process to identify, predict and evaluate the environmental effects of proposed actions and projects*'[23]. There are three main EIA documents produced as part the pre-application process for developments requiring development consent under the Planning Act 2008 (as amended). These are:

- Scoping Report: The Scoping Report sets out the likely significant effects from a project (scope). It also presents the data collected and the proposed assessment methodology and approach that would be used during the EIA. The Scoping Report is issued to consultees for comment on the scope and methodology proposed
- Preliminary Environmental Information (PEI) Report: The PEI Report sets out the information that '*is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development*'[24]. The PEI Report is used by consultees to inform their consultation responses during the Statutory Consultation
- Environmental Statement (ES): The ES presents the results of the EIA undertaken for the project. It identifies the likely significant effects that would result if the Project was implemented, and any proposed mitigation to reduce those significant effects. The ES is submitted as part of the application for development consent and is considered during the decision-making process

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

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

5.1.4 Each aspect chapter (Chapters 6 to 20) will clearly define its approach to the evaluation of the significance of an effect. This section provides details of the

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

5.2 Regulatory Context and EIA Requirements

5.2.1 On 22 December 2023, the Secretary of State (SoS) gave a direction for the purposes of section 35 of the Planning Act 2008 for the Project to be treated as development for which development consent is required under the Planning Act 2008[25,26]. This means, an application for development consent (the Development Consent Order (DCO) Application) will be made to the SoS for determination in accordance with the Planning Act 2008[27]. In accordance with Regulation 5(2)(a)[28] of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (APFP Regulations), the DCO Application will be accompanied by an ES pursuant to the Infrastructure Planning (Environmental Impact Assessment) Regulations[29] (the EIA Regulations).

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

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

a) population and human health;

b) biodiversity, with particular reference to species and habitats protected under Directive 92/43/EEC and 2009/147/EC;

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

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

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

(3) The effects referred to in paragraph (2) on the factors set out in that paragraph must include the operational effects of the proposed development, where the proposed development will have operational effects.'

5.2.3 These aspects are considered within the aspect specific chapters (Chapters 6 to 18) of this EIA Scoping Report.

5.2.4 Regulation 5(4) of the EIA Regulations states that the EIA should include, where relevant, 'the expected significant effects arising from the vulnerability

of the proposed development to major accidents or disasters that are relevant to that development'. This aspect is considered within Chapter 20 Major Accidents and Disasters of this report.

5.2.5 Schedule 4(5)(e) of the EIA Regulations states that a description should be included, of the significant effects arising from the '*the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources'*. This requirement is addressed within Chapter 19 Cumulative Effects of this report.

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

5.2.7 The requirements set out in the EIA Regulations are further explained in Planning Inspectorate (PINS) Advice Notes. These advice notes are held on the PINS website. These advice notes include the following in relation to the EIA process:

- Advice on EIA Notification and Consultation
- Advice Note Seven: Environmental Impact Assessment: Process, PEI Report and ES
- Advice Note Nine: Rochdale Envelope
- Advice on Transboundary Impacts and Process
- Advice on the Preparation and Submission of Application Documents
- Advice on Cumulative Effects Assessment

5.2.8 Other advice notes relate to particular environmental aspects and these may be referred to elsewhere in this EIA Scoping Report.

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

5.2.10 More information on the EIA process is set out in section 5.4 of this report.

5.3 Relationship with Other Regulatory Regimes and Assessments

5.3.1 Alongside the EIA process, a number of other assessments will be undertaken and included as part of the application for development consent and to support the permit and licence applications. Assessments for the EIA process supports the DCO application. Assessments for the permit and

licence application are attributed to the separate agreements and controls for the operation of the Project aligning to the requirements of the Environmental Permitting Regulations 2015. Some of these assessments will form separate reports, either corresponding to separate legislative or good practice requirements, whilst others will be integrated in the EIA process.

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

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

- The Habitats Regulations Assessment, to comply with the Conservation of Habitats and Species Regulations 2017[30], will be provided as a separate appendix to the PEI Report/ES and referenced in the EIA
- Water Framework Directive assessment report, will be provided as a separate appendix to the PEI Report/ES and referenced in the EIA
- A Flood Risk Assessment, will be provided as a separate appendix to the PEI Report/ES and referenced in the EIA
- A Health Impact Assessment, will be provided as a separate appendix to the PEI Report/ES and referenced in the EIA
- An Equality Impact Assessment (EqIA), which will provide information in terms of groups with protected characteristics under the Equality Act 2010 and social inequalities, will be relevant for consideration of vulnerable groups and health inequalities. Equality effects will be considered in a separate EqIA which will be submitted as part of the DCO application if significant impacts are identified at the screening stage of the EqIA process

5.3.4 The recent Supreme Court judgment on the Finch case (Finch v Surrey County Council [2024] UKSC 20) has been considered in the preparation of this EIA Scoping Report and the proposed scope and methodology for each aspect, with particular attention to potential upstream and downstream direct and indirect effects where practicable and appropriate. In this context, the terms ‘upstream’ and ‘downstream’ refer respectively to effects arising from activities that are required to facilitate the development of the Project and activities that are consequential to the Project (i.e. inputs to and outputs from the Project). In this EIA Scoping Report, certain aspects, such as water and aquatic ecology consider downstream impacts from a water flow perspective, for example, impacts from releases of water from the Project, with downstream meaning down from the outfall point along the River Thames. However, here we refer to upstream and downstream effects in the general sense.

5.4 The EIA Process

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

5.4.2 This is important to note for this EIA, as the design and proposed construction approach of the Project is still being refined and is likely to evolve further following submission of this EIA Scoping Report, as a result of design development or consultation responses, including any mitigation measures that are incorporated during the EIA. It is not, however, anticipated that the Project that is the subject of the EIA and application for development consent will be materially different (i.e., location, scale, design and use of technology) from the Project that is the subject of this EIA Scoping Report.

5.4.3 Figure 5.1 below sets out the principles of the EIA process.

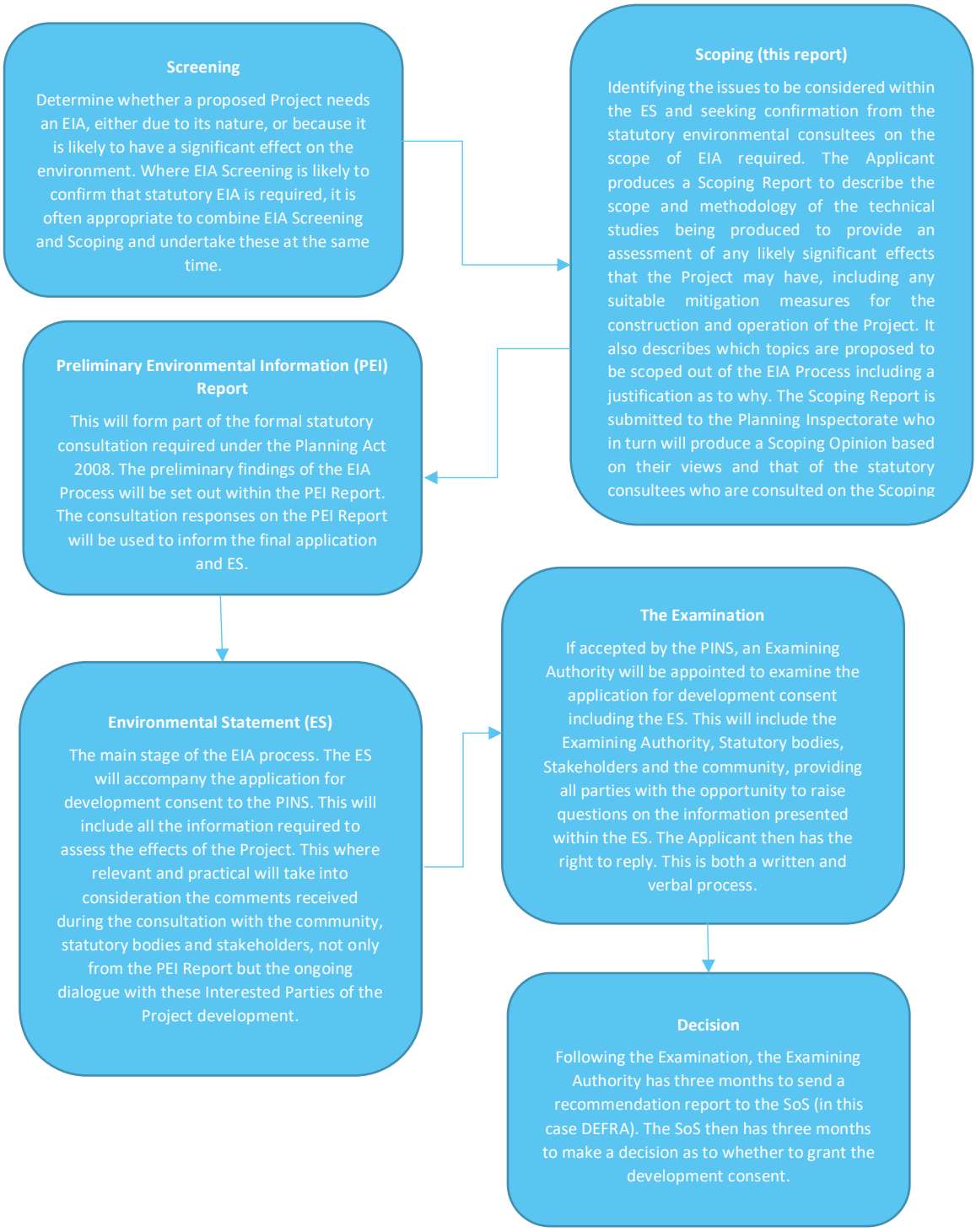


Figure 5.1 EIA Process

General approach

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

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

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

5.4.7 The following sections of this chapter of the EIA Scoping Report sets out further detail on key aspects of the assessment methodology that will be applied in the EIA. The methodology set out in this chapter provides an overview of the generalised approach and principles behind the assessment of impacts and likely significant effects. Specific guidance on impact assessment has developed for many environmental aspects, which can vary from the generalised approach set out in this chapter. Consequently, each chapter sets out the aspect specific methodologies to impact assessment that will be adopted in the EIA.

5.5 Establishing Baseline Conditions

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

5.5.2 Baseline conditions can be described as the current baseline (the conditions currently identified by survey etc.) or the future baseline (the predicted baseline in the future if the Project were not to go ahead). This allows the consideration of a 'do nothing' scenario, to allow, where relevant, the assessments to compare the scale of environmental changes both with and without the Project. Different aspect chapters use different years as appropriate to aspect specific guidance. For example, the air quality aspect will use representative data available from varying sources provided by local and national air quality studies aligned with regulatory dates.

5.5.3 The EIA will consider other developments that are likely to come forward during the construction of the Project and, where appropriate, these will be factored into the definition of the baseline or identified as receptors. Further details on the approach to such other developments are provided in Chapter 19 Cumulative Effects.

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

5.6 Scope of the Assessment

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

- Technical requirements
- Spatial scope
- Temporal scope

Technical requirements

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

5.6.3 This requirement and the broad categories set out in Schedule 4, along with others which are considered to have the potential to lead to significant environmental effects, have been interpreted and applied in the context of the Project. Table 5.1 sets out where these EIA Regulations aspects are covered within this EIA Scoping Report.

Table 5.1 Environmental aspects considered in the EIA Scoping Report

EIA Regulations aspect	Location within this report
Population	Chapter 18 Traffic and Transport Chapter 16 Socioeconomic, Community, Access and Recreation Chapter 13 Water Resources and Flood Risk
Human Health	Chapter 6 Air Quality Chapter 7 Noise and Vibration Chapter 14 Human Health
Biodiversity	Chapter 9 Terrestrial Ecology Chapter 10 Aquatic Ecology
Land	Chapter 11 Ground Conditions and Contaminated Land
Soil	Chapter 11 Ground Conditions and Contaminated Land Chapter 13 Water Resources and Flood Risk
Water	Chapter 13 Water Resources and Flood Risk Chapter 10 Aquatic Ecology
Air	Chapter 6 Air Quality
Climate	Chapter 15 Carbon and Climate Change
Material Assets	Chapter 17 Waste and Materials Chapter 8 Historic Environment Chapter 11 Ground Conditions and Contaminated Land
Cultural Heritage	Chapter 8 Historic Environment
Landscape/ Townscape	Chapter 12 Townscape and Visual Amenity
The inter-relationship between the above factors	Chapter 19 Cumulative Effects
The Risk of Major Accidents and/or Disasters	Chapter 20 Major Accidents and Disasters

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

Spatial scope

5.6.5 The maximum area of land to build and operate the Project will be defined by the Order Limits proposed with the application for development consent. The Order Limits will include the working width to install all underground conveyance routes, the tertiary treatment plant (TTP), shafts and intake and outfall structures, including the construction compounds, road access points, land required for permanent above and below ground features, and all ancillary works.

5.6.6 The spatial extent of each of the technical assessments will vary in accordance with the relevant policy and guidance for the assessment of that aspect. In some instances, the environmental effects will extend no further than the Order Limits (for example, archaeology) and in other cases (for example, townscape and visual) the assessment will extend to a buffer beyond the Order Limits.

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

5.6.8 The spatial scope of the EIA will be considered in the PEI Report/ES in terms of the following:

- Physical extent of the proposed works (whether temporarily or permanently) as defined by the Order Limits proposed with the application for development consent
- Nature of the existing and future baseline environment (including sensitive receptors or designations) as defined in the technical sections
- Geographical extent of impacts beyond the Order Limits
- Relevant geographical boundaries of administrative organisations and authorities which will provide the relevant planning and policy context of the Project

Flexibility of design

5.6.9 The PINS Advice Note Nine[31] states it is for the Applicant to choose whether there is a need to incorporate flexibility (and how much) into applications to address uncertainty. The Rochdale Envelope principle (see R v Rochdale MBC ex parte Tew (1999) and R v Rochdale MBC ex parte Milne (2000)) is an accepted way of dealing with uncertainty in preparing development applications. The 'Rochdale Envelope' approach is employed '*where the nature of the Proposed Development means that some details of the project have not been confirmed (for instance the precise location or dimensions of structures) when the application is submitted, and flexibility is sought to address uncertainty*'.

5.6.10 Where the details of the Project cannot be defined precisely, flexibility will be sought, in alignment with the Rochdale/Design Envelope approach.

5.6.11 At this relatively early stage in the design process there is inevitably uncertainty and therefore flexibility is required, both at scoping and for the DCO submission upon which the EIA will be based. This flexibility is addressed through design envelopes based on realistic worst-case scenarios and in some cases through optionality where more than one option is being considered.

5.6.12 Flexibility is required for this Project as elements of the scheme are yet to be finalised in terms of choice of technology, and for several elements there are options under consideration of which a preferred option is yet to be selected, for example the location of access to the Thames Lee Tunnel (TLT). To the best of the Applicant's knowledge, the maximum parameters, and all likely options where options exist, are presented in Chapter 2 The Project to allow for the flexibility required to inform the scope of the EIA at this stage. Flexibility in terms of maximum parameters is likely to be retained throughout the EIA and presented in the DCO submission. On this basis, the impacts of the Project as it may be constructed can be identified and effects properly assessed.

5.6.13 The scope of the proposed assessment in EIA is based on the Project as set out in Chapter 2 The Project. The EIA Scoping Boundary, which includes all land being considered for the purposes of the Project (Figure 1.1 in Appendix A Plans) constitutes "*a plan sufficient to identify the land*" for the purposes of this EIA Scoping Report. It represents the maximum extent of land that could be required for temporary or permanent purposes in order to construct, operate and maintain the Project. The geographical extent of the study areas for the different environmental aspects (as referenced above) will generally be greater than the EIA Scoping Boundary and, as referenced in paragraphs 5.6.5 - 5.6.8 above, will vary depending on the environmental aspect and specific receptors or features of the environment that could be affected by the scheme for that topic.

5.6.14 The land required for the Project will be refined as design work progresses, considering environmental and technical factors, and consultation feedback. This allows for a reasonable degree of flexibility to accommodate changes to detailed design, whilst ensuring that the maximum extent of the Project is considered and that the scope of the EIA can be adequately identified.

5.6.15 Where optionality remains, for example an alternative location for a structure or more than one process option, this is made clear, and the scope of assessment takes account of any options being taken forward.

5.6.16 When the Project reaches its Statutory Consultation, including the publication of the PEI Report, and at the point that the ES is submitted with the DCO application, every attempt will be made to narrow the range of options and explain clearly which elements of the Project have yet to be finalised and give reasons. The Project parameters will be clearly defined in the draft DCO and therefore in the accompanying ES. The EIA Scoping Boundary will develop to become the Order limits and the Limits of Deviation (LoD) presented in the DCO application. The LoD define the maximum extent within which the Project can be built.

5.6.17 LoD will be introduced for the Project to define the maximum extent within which the TTP, conveyance route, outfall and intake structures and ancillary works can be built. Applying LoD is normal practice for DCOs as they allow for the refinement of the preliminary design, on which the DCO plans are based, during the detailed design stage.

5.6.18 The EIA will take a reasonable worst-case approach when undertaking the assessment. This allows for minor deviations in the siting and alignment as design work progresses, considering environmental and technical factors, consultation responses and construction, without triggering the need to revise the EIA.

5.6.19 However, sufficient detail is available at this stage to enable robust scoping of the EIA process. Should subsequent design changes require amendments to the approach taken to the EIA, these amendments will be discussed and agreed in advance with the relevant technical stakeholders.

Temporal scope

5.6.20 The temporal scope of EIA will be considered in the PEI Report/ES in terms of the following principal stages of development:

- Existing conditions of the proposed site and the surrounding areas (the existing baseline)
- Future conditions without the Project (the future baseline)
- Proposed construction phase (c. 2029 to 2031)
- Operation (assumed in 2033, with maintenance in perpetuity)
- No future decommissioning (operated indefinitely)

5.6.21 Given the Project is a drought resilience scheme that comprises an infrastructure project for the distribution of public water supply, it is assumed that the Project will be operated, within its operational parameters, indefinitely. It is, therefore, proposed to scope decommissioning out of the assessment. Whilst decommissioning would be scoped out of the ES, consideration of dismantling and replacing of equipment will be considered as part of the operation and maintenance of the Project.

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

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

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

5.6.24 Environmental effects will be classified as either permanent or temporary, as appropriate. Permanent changes are those which are irreversible (e.g. permanent land take) or will last for the foreseeable future (e.g. habitat destruction or fragmentation).

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

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

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

5.7 Assessment of Effects and Determination of Significance

Impacts and effects

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

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

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

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

'(a) the magnitude and spatial extent of the impact

(b) the nature of the impact

(c) the transboundary nature of the impact

(d) the intensity and complexity of the impact

(e) the probability of the impact

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

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

(h) the possibility of effectively reducing the impact'

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

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

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

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

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

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

(e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;

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

(g) the technologies and the substances used.

5.7.6 The description of the likely significant effects on the factors specified in regulation 5(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to

the project, including in particular those established under Council Directive 92/43/EEC(1) and Directive 2009/147/EC(2).'

Determination of significance

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

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

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

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

5.7.11 Table 5.2 provides broad definitions of sensitivity or value, which have been adapted from good practice assessment guidance. Each aspect chapter defines the sensitivity or value of matters specific to that aspect where scoped into the assessment.

Table 5.2 Value and sensitivity criteria

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

5.7.12 The second step of the assessment will determine the likely magnitude of the potential impact. This is the scale of the change caused to the baseline conditions, considering both the degree of change from the baseline conditions and the duration and/or reversibility of the effect. The assessment of magnitude takes into consideration all primary and tertiary measures and good practice measures as described in section 5.8.

5.7.13 Table 5.3 provides broad definitions of magnitude, which have been adapted from good practice assessment guidance. Each aspect chapter defines the magnitude criteria of matters specific to that aspect where scoped into the assessment.

Table 5.3 Magnitude criteria

Magnitude	General criteria
Large	Adverse: Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements. Beneficial: Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality
Medium	Adverse: Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements Beneficial: Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Small	Adverse: Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements. Beneficial: Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible/no change	Adverse: Very minor or no loss/detrimental alteration to one or more characteristics, features or elements. Beneficial: Very minor or no benefit or positive addition to one or more characteristics, features or elements.

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

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

5.7.16 Figure 5.2 uses merging bands to reflect the role of professional judgement when allocating significance. This is of particular relevance where the assessment is based on a qualitative approach and the significance of effect is a matter of judgement rather than a quantified outcome. Explanatory text will be provided to explain how professional judgement, where used, has determined the significance assigned.

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

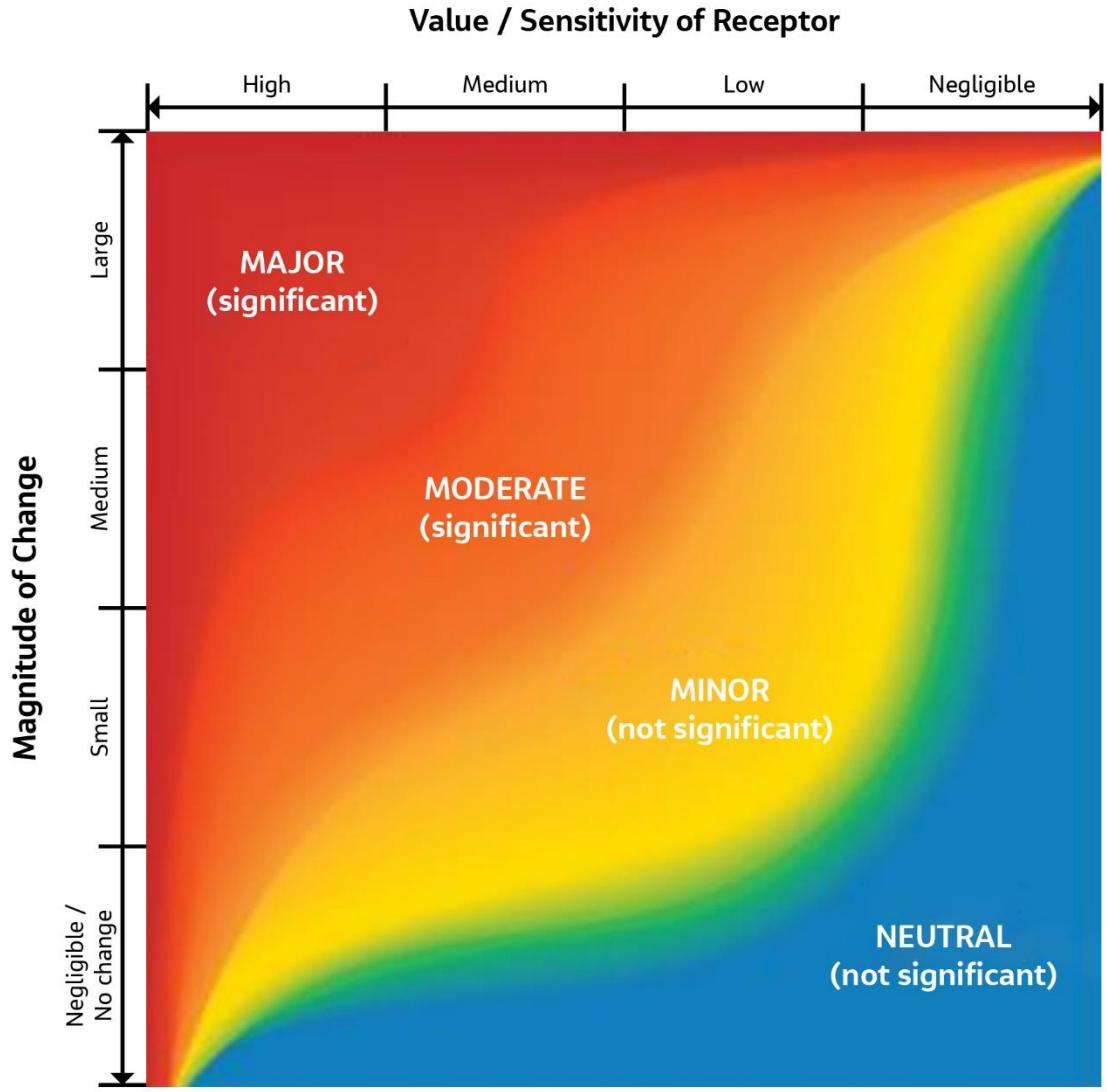


Figure 5.2 Matrix of significance

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

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

5.7.20 As an illustration, a high sensitivity receptor subject to a large magnitude of change would experience a major significance effect, and a negligible sensitivity receptor subject to a medium magnitude of change would experience a minor or neutral significance effect.

5.7.21 Effects will be concluded as either significant or not significant unless otherwise stated in the individual chapters. As stated above and illustrated in Figure 5.2 allocating significance requires the application of professional judgement and thus the bands between levels of significance and indeed significant or not significant effects can vary. In general, however, where effects are scored minor or negligible/no change, these effects are not significant in the context of the EIA Regulations and as such will not be reported in detail in the PEI Report/ES. The exception to this is where the combination of multiple minor effects has the potential to lead to a significant (i.e. moderate or above) cumulative effect.

5.8 Mitigation

5.8.1 Regulation 14(2)(c) of the EIA Regulations[32] requires that the ES must include at least: *"(c) a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment*;"

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

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

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

5.8.4 For the purposes of the EIA, mitigation has been defined using guidance taken from the Institute of Environmental Management and Assessment (IEMA)[33] with mitigation falling into three categories:

- Primary (inherent/embedded) mitigation - these being measures that form an intrinsic part of the Project design for the purpose of avoiding, preventing or minimising likely significant adverse environmental effects. For example, reducing the height of a development to reduce visual impact. Where adverse effects can be reduced to acceptable levels

through evolution of the Project design (primary mitigation), this will be identified within the EIA

- Secondary (foreseeable) mitigation – this requires further activities or measures in order to reduce likely significant adverse environmental effects. For example, planting trees to screen views where a development is visually intrusive. These measures will be identified during the EIA process to further prevent, reduce and, where possible, offset any adverse effects on the environment and will be described in the relevant aspect chapters
- Tertiary (inexorable/good practice) mitigation – these measures to reduce reasonably foreseeable impacts, will be required regardless of any EIA assessment, as they are imposed, for example, as a result of legislative requirements. For example, legislation, permits and guidance related to the management of protected species, flood prevention and pollution control. These measures will be captured in the relevant Project documents such as the Code of Construction Practice (CoCP) and associated environmental management plans

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

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

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

5.8.7 The mitigation, compensation and offsetting measures would be detailed within the relevant PEI Report/ES chapters but would be secured though a series of 'control documents' which will form part of the DCO submission. A Projects Control Plan or similar will be developed to provide the framework on how mitigation, monitoring and controls work together and are secured in the DCO application. The series of control and management documents such as CoCP and environmental management plans will present the mitigation identified in the application that must be implemented during the

design, construction and operation of the Project to reduce the adverse impacts.

5.9 Residual Effects

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

5.10 Cumulative Effects

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

5.10.2 The scope of the EIA cumulative effects section will be to address inter-relationships and cumulative effects with developments in the locality of the Project (where relevant):

- The relationships between different aspects of the environmental impacts associated with a proposed development affecting the same receptor could lead to significant effects (intra project effects) and/or
- The potential for effects of the Project to combine with effects from other developments in the vicinity and lead to significant effects (inter project effects)

5.10.3 For inter project effects PINS has set out in its advice note on cumulative effects (Advice on Cumulative Effects Assessment) a four staged approach to assessing potential cumulative effects. The four stages comprising:

- Stage 1 - Identifying a Long list of potential other developments
- Stage 2 - shortlisting this Long list to identify relevant other developments requiring further assessment
- Stage 3 - gather information on these shortlisted other developments
- Stage 4 - undertake the assessment and report these finding in the PEI Report/ES chapter

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

there are specific limitations associated with data, these will be highlighted as the assessment progresses.

5.10.5 The approach to the assessment of cumulative effects is set out in detail in Chapter 19 of this EIA Scoping Report.

5.11 Monitoring

5.11.1 The EIA Regulations introduced a requirement on the SoS to consider whether it would be appropriate to impose monitoring of any significant adverse effects on the environment from a Project. The PEI Report/ES will set out clear and proportionate objectives for monitoring, where required, along with a timescale for implementation, identification of the party who would be responsible for the monitoring, together with an outline of the remedial actions to be undertaken should results identify a need.

5.12 The EIA Team

5.12.1 Regulation 14(4) of the EIA Regulations[34] places a specific requirement on the Applicant to ensure that those preparing the ES are 'competent experts'. In addition, there is a requirement that the ES must be accompanied by a statement outlining the relevant expertise or qualifications of such experts. No definition of competent expertise is provided in the EIA regulations, however individuals preparing the ES will comply with the Institute of Environmental Management and Assessment (IEMA) position statement on competent expertise.

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

The current EIA team (scoping)

5.12.3 This EIA Scoping Report has been produced by qualified and experienced Jacobs UK consultants, with input from consultants at Ricardo Energy and Environment and from Adams Hendry Consulting. All firms are registered to IEMA's EIA Quality Mark.

6 Air Quality

6.1 Introduction

6.1.1 This chapter of the Environmental Impact Assessment (EIA) Scoping Report sets out the proposed scope of EIA in relation to air quality and should be read in conjunction with the description of the Project as presented in Chapter 2 The Project.

6.1.2 The construction and operation of the Project has the potential to result in odour, dust and air quality impacts at sensitive receptors (such as residential properties and designated ecological sites).

6.2 Consultation and Engagement

6.2.1 Non-Statutory Public Consultation was undertaken from October 2023 to December 2023 to seek feedback about the site options for the Project from customers, stakeholders, and anyone with an interest in the Project. In relation to air quality the responses tended to be general, relaying potential concerns about dust pollution during construction and odours during operation.

6.2.2 Engagement was undertaken with environmental health officers of London Borough of Hounslow (LBH), London Borough of Richmond upon Thames (LBR), and Royal Borough of Kingston upon Thames (RBK) on 16 July 2024 via video link. The Project team outlined the baseline environment for air quality and proposed assessment methodology, as presented in section 6.6 of this chapter, including which matters were proposed to be scoped in and which were proposed to be scoped out. No issues relating to the information presented were raised during the meeting.

6.3 Legislation and Policy Review

6.3.1 Key policy relevant to air quality set out in the National Policy Statement (NPS) for Water Resources Infrastructure[35] includes:

- Paragraph 4.2.3 requires the applicant, through design, to minimise the emissions of air pollutants as far as reasonably practicable
- Paragraph 4.2.4 emphasises greater consideration should be afforded to those water resources infrastructure projects within or adjacent to Air Quality Management Areas (AQMAs), any road links exceeding limit values, densely populated areas or particularly sensitive human receptor locations such as schools and hospitals
- Paragraph 4.2.5 details the requirements of the content of an Environmental Statement (ES) air quality chapter

- Paragraph 4.2.6 requires the applicant to include future projections of air quality and detailed modelling to demonstrate local impacts, where appropriate
- Paragraph 4.2.7 requires the applicant to work with the relevant authority to secure appropriate mitigation measures to ensure that any statutory air quality limits and objectives are not breached and sufficient consideration of air quality targets is made
- Paragraph 4.2.11 states that the Secretary of State (SoS) should consider air quality impacts in the vicinity of the proposed development and also the wider area that is likely to be affected
- Paragraph 4.2.12 states that SoS should be satisfied with the proposed construction and operational mitigation put forward by the applicant
- Paragraph 4.2.14 states that the SoS should refuse consent where air quality impacts of the development will result in a breach of the statutory air quality objectives or where it is likely to hinder achievement of statutory emission and concentration targets

6.3.2 In addition to the policy set out in the NPS for Water Resource Infrastructure, the Project would also have regard to other relevant legislation, policy, standards and guidance for air quality as listed in Table 6.1 and summarised in Appendix B.

6.3.3 A detailed summary of the legislative, policy and guidance framework for air quality, and how it accords with the Project, will be provided in the Preliminary Environmental Information (PEI) Report and/or ES.

Table 6.1 Relevant legislation, policy and guidance

Relevant legislation, policy and guidance
Legislation
The Environment Act 2021, including the Environmental Targets (fine particulate matter) Regulations 2023[36]
The Environmental Protection Act 1990 – Part III – in relation to nuisance dust and odour
The EU Directive 2008/50/EC2 on ambient air quality and clearer air for Europe (the CAFE directive)[37]
The Air Quality Standards Regulations 2010 (as amended in 2019)[38]
National policy
The Clean Air Strategy[39]
Air Quality Strategy for England[40]
NPS for Water Resources Infrastructure 2023[41]

Relevant legislation, policy and guidance
The National Planning Policy Framework (NPPF) 2023[42]. It is noted that the NPPF (2024) was under consultation until September 2024
Planning Practice Guidance for Air Quality (2019)[43]
Local policy
The London Plan 2021[44]
The LBH Local Plan 2015 - 2030[45] and the LBH Local Plan 2020 - 2041 (emerging policy)
LBH Supplementary Planning Document on Air Quality[46]
LBH Air Quality Action Plan 2023[47]
The LBR Local Plan 2015 - 2018[48] and the LBR 'Pre-Publication' Draft Local Plan (2024)[49]
The LBR Supplementary Planning Document on Air Quality[50]
The LBR Air Quality Action Plan (2020-2025)[51]
The RBK Core Strategy 2012[52] and Kingston's Local Plan 2019 - 2041 (emerging policy)[53]
The RBK Air Quality Action Plan (2021)[54]

6.4 Existing Environment and Baseline Conditions

Study area

6.4.1 The extent of the study area is determined by the IAQM: Guidance on the Assessment of Dust from Demolition and Construction (2024)[55], Design Manual for Roads and Bridges (DMRB) LA 105 Air quality document (2019)[56], EPUK/IAQM: Land Use Planning and Development Control - Planning for Air Quality (2017)[57] and Environment Agency air emissions risk assessment[58] each of which provides different distances within which air quality impacts from road traffic, construction dust and combustion sources should be considered for nearby human and ecological receptors. Table 6.2 below summarises the study area criteria from the aforementioned guidance.

Table 6.2 Study area

Study area criteria	Applies to human receptor	Applies to ecological receptor
<u>Road traffic</u> 200m from affected road network (ARN) - DMRB LA 105 Air quality document 2019 The ARN, according to IAQM planning guidance (2017), is any area within which there is: • *"A change in Light Duty Vehicle flows of:* – *More than 100 Annual Average Daily Traffic (AADT) within or adjacent to an AQMA; or* – *More than 500 AADT outside of an AQMA;* • *A change in Heavy Duty Vehicle flows of:* – *More than 25 AADT within or adjacent to an AQMA; or* – *More than 100 AADT outside of an AQMA"*	✓	✓
<u>Construction dust – human receptor</u> In accordance with the IAQM construction guidance (2024), the potential for dust impacts at human receptors should be considered for receptors within 250m of the site boundary and within 50m of the routes to be used by construction vehicles on the public highway, up to 250m from the site entrance(s).	✓	
<u>Construction dust – ecological receptor</u> In accordance with the IAQM construction guidance (2024), the potential for dust impacts at ecological receptors should be considered where there are dust-sensitive ecological receptors within 50m of the site boundary; or within 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the site entrance(s).		✓
<u>Combustion sources – ecological receptor</u> The air emissions risk assessment for environmental permits (which applies to industrial emission sources) currently identifies distances of 2km for local and nationally important sites and areas of ancient woodland, and 5km, 10km or 15km depending on the emission source for European sites*.	✓	✓
*Although the criteria apply to ecological receptors, it is standard practice to consider a similar distance for combustion source impacts on both ecological and human receptors.		

6.4.2 When considering the study area for road traffic emissions, the extent would be 200m from the ARN. The ARN will be determined based on the IAQM planning guidance (2017) and criteria set out in Table 6.2.

6.4.3 The furthest extent of the study area for construction dust emissions would extend up to 250m of the site boundary and 50m from the construction road network that will be used by the Project. These construction routes will be determined through further assessment and engagement with the local authorities.

6.4.4 The furthest extent of the study area for this Project relates to the consideration of combustion sources. As set out in Table 6.2 this could extend up to 15km from the source, however such an extent would only be relevant for large combustion sources (>50MW). Given that combustion plant (i.e., generators and non-road mobile machinery (NRMM)) used during construction of this Project will typically be less than 5MW, the study area for this Project will extend up to 10km away from the Project. The study area for the Project in relation to the consideration of air quality aspects is set out in Plan 6.1 in Appendix A Plans.

6.4.5 In terms of odour this matter is proposed to be scoped out. The reasons for which are set out in section 6.5 and in Appendix D.

Baseline conditions

Air Quality Management Areas

6.4.6 The Project is located within three different local authority areas. These comprise: LBH (Mogden STW site); LBR (intermediate and reception shaft and outfall) and RBK (intake and TLT connection shaft). All three local authorities have declared their entire borough as an Air Quality Management Area (AQMA) due to exceedances of the air quality objective for nitrogen dioxide (NO_2) and/or particular matter (PM_{10}) due to road traffic emissions. All three local authorities also have several Air Quality Focus Areas (AQFA) designated by the Greater London Authority (GLA). LBH has five AQFAs, LBR has four AQFAs, and RBK has two AQFAs. Plan 6.2 in Appendix A Plans shows the locations of the AQFAs closest to the Project, the closest being Twickenham Town Centre located in LBR 300m away from the above ground sites of the Project.

6.4.7 These AQFAs are locations that not only exceed the EU annual mean limit value for NO_2 but are also locations with high human exposure. They were defined to address concerns raised by boroughs within the LAQM review process and forecasted air pollution trend.

6.4.8 Baseline air quality data is available from the London Air Quality Monitoring Network[59], the Local Authorities' monitoring campaigns, UK Eutrophying and Acidifying Atmospheric Pollutants (UKEAP) monitoring network and

Department for Environment, Food and Rural Affairs (Defra) Background Mapping data for local authorities[60]. The pollutants of potential concern due to traffic and combustion sources associated with this Project are - nitrogen oxides (NOx), NO_2, PM_{10}, fine particulate matter ($PM_{2.5}$) and ammonia (NH_3)). Baseline data sourced around the Project is summarised below.

Monitored concentrations

6.4.9 All three local authorities in which the Project is located employ the use of NO2 diffusion tubes (DT) at a range of locations across their authority and some also employ the use of automatic monitoring (AM) stations which measure NO2, PM10 and PM2.5. To understand the baseline, monitoring data have been sourced from the nearest monitoring sites to the Project. These monitoring locations, which include DT sites within 1km of the EIA Scoping Boundary and AM stations within 4km of the EIA Scoping Boundary, are considered representative of the study area given their proximity to the Project.

6.4.10 Details of the closest monitoring DT sites and AM stations to the Project, which monitor annual mean NO_2, hourly mean NO_2, annual mean PM_{10}, daily mean PM_{10} and annual mean $PM_{2.5}$, are presented in Plan 6.5 in Appendix A Plans and the tables within Appendix C Air Quality Monitoring Data. A summary of the findings of the existing baseline data review is as follows:

- Overall, annual mean NO_2 concentrations at the monitoring sites have reduced year by year. Using the latest year (2022) of representative and available data at the stage of scoping[61], the annual mean NO_2 concentrations still remain below the National Air Quality Objective (NAQO) of 40µg/m^3 at all locations within a distance of 1km from the EIA Scoping Boundary
- NO_2 hourly mean NAQO was achieved at all the nearby AM stations. The annual mean NO_2 concentrations at the nearby monitoring sites are less than 60µg/m^3 at all the DTs, and as such it is expected that the hourly mean objective would also be achieved
- Annual mean PM_{10} concentrations at the AM stations are within the NAQO of 40µg/m^3 at all nearby sites with a maximum concentration of 26µg/m^3 at Cromwell Road in 2019
- PM_{10} daily mean NAQO was achieved at all the nearby AM stations with a maximum number of daily exceedances of 50µg/m^3 experienced for 15 days at Cromwell Road in 2019. This is much lower than the 35 times a year stipulated in the NAQO
- Annual mean $PM_{2.5}$ concentrations at the nearby AM stations are within the NAQO of 25µg/m^3 at all nearby sites with a maximum concentration of 12µg/m^3 at Chiswick in 2022. However, annual mean $PM_{2.5}$ levels exceed the proposed Environment Act 2021 target of 10µg/m^3 at most of the nearby sites

- The estimated Defra background concentrations within 1km of the EIA Scoping Boundary for 2018 for all pollutants are all well within the annual mean NAQOs except for the vegetation protection guideline (an annual mean of 30µg/m^3) for NO_x. $PM_{2.5}$ complies with the NAQO of 25µg/m^3 but is above the proposed Environment Act 2021 target of 10µg/m^3

6.4.11 The closest station monitoring NH_3 is located at London Cromwell Road 2, approximately 10 km away. The most recent annual mean NH_3 concentration at this site for 2023 was 2.4µg/m^3, which is higher than the environmental standard of 1µg/m^3 where sensitive habitats such as lichens or bryophytes (including mosses, liverworts and hornworts) are present but less than the standard of 3µg/m^3 where they are not present. Higher plants are considered to be less sensitive and, for this reason, the annual critical level for higher plants is 3µg/m^3 but is reduced to 1µg/m^3 where lower plants (lichens and bryophytes) are a particular interest feature of a habitat[62]. The presence or absence of these habitats will be confirmed through further ecological assessment.

6.4.12 It is expected that future baseline concentrations would decrease compared with the existing baseline concentrations due to implementation of the Ultra Low Emission Zone and vehicle emissions improvement. This improvement is reflected in the Defra background concentrations forecast.

6.4.13 Therefore, on the basis of the extensive air quality data coverage in the study area and expected reduction in baseline concentrations, no additional baseline monitoring is proposed to support the ES.

6.5 Sensitive Receptors and Potential Environmental Effects

Sensitive receptors

6.5.1 The Project is located close to human receptors, a mixture of residential areas, watercourses, agricultural land bordered by hedgerows, sensitive ecological land uses with local designations (i.e., Local Nature Reserves (LNRs), Sites of Importance for Nature Conservation (SINC)) and national and international designations (i.e., Special Protection Area (SPA), Site of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Ramsar). The key human receptors nearest to the EIA Scoping Boundary are made up of residential, schools and a hospital and the key ecological receptors within 10km of the EIA Scoping Boundary have been identified, and these are detailed in Table 6.3. The full list of ecological receptors is provided in Table 9.2, Chapter 9 Terrestrial Ecology. The list of human receptors is preliminary and will be revised as appropriate once more detail on the extent of the affected road network has been determined through further assessment.

6.5.2 Plan 6.3 in Appendix A shows the locations of the key ecological receptors and Plan 6.4 in Appendix A shows the locations of schools and hospitals in the study area.

Table 6.3 Sensitive air quality receptors[63]

Ecological receptors	Residential properties	Schools, hospitals
South West London Waterbodies SPA (5.5km)	Properties in the St Margarets area and Twickenham area including: Riverside Drive; Dukes Avenue; Dawes Avenue; Drake Avenue; Northcote Road; Sidney Road; Moor Mead Road; Victoria Road; Haggard Road; Lebanon Park; Dukes Avenue; and Burnell Avenue.	Orleans Park School
South West London Waterbodies Ramsar (5.5km)		St Mary's Primary School (juniors)
Richmond Park SAC (1.3km)		Grey Court School
Wimbledon Common SAC (4.7km)		The Cassel Hospital
Richmond Park SSSI (1.3 km)		St Marys University
Bushy Park and Home Park SSSI (1.4km)		Meadlands Primary School
Syon Park SSSI (1.5km)		The Tiffin Girls School
Barn Elms Wetland Centre SSSI (6.6km)		St Richards Primary and Nursery School
Mogden Sewage Works SINC (0m)		
Ham Lands LNR and SINC (0m)		
River Thames and tidal tributaries SINC (0m)		
Duke of Northumberland's River north of Kneller Road SINC (0m)		
Royal Park Gate Open Space SINC (0m)		

Construction phase

Vehicle exhaust emissions

6.5.3 There are several options for the construction traffic routing and these have been detailed in Chapter 18 Traffic and Transport which involve HGV traffic movements both north and south of the River Thames. The additional HGV along several roads north of the River Thames would exceed the IAQM threshold of 25 AADT for the peak construction year. Therefore, there is the potential for air quality impacts on human receptors and ecological receptors due to vehicle exhaust emissions. Consequently, it is proposed to scope in this matter and detailed modelling would be undertaken as part of the assessment within the ES to assess potential impacts of vehicle emissions on these receptors.

Non-road mobile machinery, generator and combustion plant emissions

6.5.4 At this stage, the emissions associated with the combustion sources (i.e., generators) used during the construction phase are not yet known, however it is likely that they could exceed the 5mg/s threshold. Furthermore, there are sensitive human receptors within 10m of the EIA Scoping Boundary and the closest ecological receptors are within 2km. Therefore, there is the potential for air quality impacts at the human receptors and ecological receptors due to combustion plant emissions. Consequently, it is proposed to scope in this matter as part of the assessment within the ES.

Dust emissions

6.5.5 There are over 1,000 human receptors within 250m of the above ground infrastructure sites, as such there is the potential for dust impacts on nearby human receptors and this matter is proposed to be scoped into the assessment within the ES.

6.5.6 There are ecological sites within 20m or 50m of the above ground infrastructure sites. Details of the construction traffic routing are not yet known to determine whether there are additional ecological sites within 50m of the construction route. If there are ecological sites that are within 50m of the construction route or located within 250m of the site entrance, then there is likely to be the potential for dust impacts at ecological sites. It is proposed to scope in this matter as part of the assessment within the ES on the basis that it is concluded that there is the potential for dust impacts on nearby ecological receptors.

Odour emissions

6.5.7 The new tertiary treatment plant (TTP) will be constructed above the existing storm tanks; however, these storm tanks will be empty prior to construction. Any cleaning of the storm tanks prior to the construction of the TTP would form part of the existing permitted operation of Mogden STW. During the

construction of the TTP, there is no potential for odour emissions. On this basis, construction odour impacts are therefore proposed to be scoped out.

6.5.8 As identified in section 11.4 in Chapter 11 Ground Conditions and Contaminated Land there is one historical landfill site (Mogden Sewage Works historical landfill [Landfill No. 1]) located in close proximity to the proposed works. However, the landfill only accepted inert waste from 1930 - 1935 and consequently earthwork activities would not be undertaken in contaminated areas which may contain odorous materials. Consideration of odour during construction phase is therefore proposed to be scoped out.

Operational phase

Vehicle exhaust emissions

6.5.9 During the operational phase, it is anticipated that chemical deliveries would be delivered by tankers. The Project is expected to generate less than 25 HGVs per day, meaning that operational air quality impacts are deemed negligible (in accordance with the IAQM guidance which states that a negligible impact is likely when the number of HGVs per day is less than 25 in an AQMA see Table 6.2) and are therefore proposed to be scoped out.

Odour emissions

6.5.10 An odour risk assessment has been undertaken in accordance with the IAQM Odour Planning guidance[64] to assess the risk of odour during the operation of the new TTP which would only receive and treat final effluent from Mogden STW thereby producing recycled water. The assessment, provided in Appendix D, included a source-receptor-pathway risk assessment, a site visit to undergo sniff tests at the current Mogden STW and to a comparable TTP. The outcome of the assessment and site visits concluded the odour effect of the planned TTP as not significant. On this basis, operational odour impacts are therefore proposed to be scoped out.

6.6 Assessment Methodology

6.6.1 The approach to the air quality assessment will be based on the following guidance documents relevant to air quality:

- IAQM: Guidance on the Assessment of Dust from Demolition and Construction[65]
- EPUK/IAQM: Land Use Planning and Development Control - Planning for Air Quality[66]
- Mayor of London: London Local Air Quality Management Technical Guidance LLAQM.TG(19)[67]
- Environment Agency and Natural Resources Wales: Specified generators: dispersion modelling assessment[68]

- GLA: Air Quality Neutral Guidance, consultation draft[69]
- London Councils: Air Quality and Planning Guidance[70], and
- Mayor of London: The Control of Dust and Emissions During Construction and Demolition - Supplementary Planning Guidance[71]

Vehicle exhaust emissions[72]

6.6.2 The potential for air quality impacts due to additional traffic generated by the Project will be determined based on the IAQM planning guidance and DMRB guidance threshold as set out in Table 6.2.

6.6.3 The threshold for requiring a vehicle exhaust emissions assessment summarised above will be exceeded to the north of the river during the construction phase but achieved during the operational phase. As such detailed dispersion modelling using ADMS-Roads will be carried out to assess the potential air quality effects on relevant sensitive human and ecological receptors (identified in Table 6.3) due to emissions of NO_x, NO_2, NH_3, PM_{10} and $PM_{2.5}$ as a result of changes in traffic flows, associated with the construction phase for the worst case year. Emission factors will be obtained from Defra's emission factors toolkit[73] and Defra guidance on ammonia emissions[74].The modelling would be undertaken using data from the most representative nearby meteorological station and representative road traffic data (flows, speeds and vehicle fleet composition) for the worst-case construction year.

6.6.4 The methodology used to assess the air quality impacts associated with traffic emissions involves air quality modelling using the ADMS-Roads software or equivalent. There is a degree of uncertainty and limitations inherent in the model software, and also depending on the accuracy of the traffic data and meteorological data used.

6.6.5 However, these uncertainties are minimised by using the appropriate data and following established good practice guidance. One such practice is the model verification exercise recommended in LLAQMTG(19), where the modelled concentration is compared with the monitored concentration and then an adjustment factor is derived to bring the modelled concentrations in line with the monitored concentrations, thus reducing the level of uncertainty.

6.6.6 Baseline concentrations described in this study suitable for representing future baseline will be established and added to modelled concentrations for comparison with the relevant air quality objectives.

6.6.7 The significance of the impacts will be ascertained based on the magnitude of change in air quality relative to the relevant air quality objectives at the sensitive receptors, using the IAQM criteria in Table 6.4 below, which is applicable to changes in annual average concentrations.

Table 6.4 Impact descriptors for individual receptors

Long-term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Objective (AQO)			
	1%	2 – 5%	6 – 10%	>10%
75% or less of AQO	Negligible	Negligible	Minor	Moderate
76 – 94% of AQO	Negligible	Minor	Moderate	Moderate
95 – 102% of AQO	Minor	Moderate	Moderate	Major
103 – 109% of AQO	Moderate	Moderate	Major	Major
110% or more of AQO	Moderate	Major	Major	Major

Non-road mobile machinery, generator and combustion plant emissions

6.6.8 The potential for air quality impacts due to combustion sources associated with the construction of the Project will be determined by considering whether the emissions sources exceed the NOx emissions rate of 5mg/s. This value of 5mg/s is the threshold for determining whether there is likely to be a significant impact and is recommended in the IAQM Planning Guidance.

6.6.9 Where this threshold is exceeded, detailed dispersion modelling (i.e. ADMS 5.2 or equivalent software) will be undertaken to investigate the magnitude of air quality impacts that could result from the use of non-road mobile machinery, generators and combustion plants on site at the nearby sensitive human and ecological receptors.

6.6.10 The cumulative impact of vehicles exhaust, generators and combustion sources emissions will then be considered with baseline air quality concentrations together with the magnitude of change in air quality relative to the relevant air quality objectives to determine the significance of the impacts at sensitive receptors in accordance with IAQM criteria, as described in Table 6.2.

Dust emissions

6.6.11 A construction phase dust risk assessment will be undertaken using the IAQM[75] and Mayor of London Dust Guidance[76] and will consider the existing baseline, the magnitude of dust as a result of the scale of construction activities (demolition, earthworks, construction and trackout) together with the effects of local meteorological conditions on the dispersion of fugitive dust emissions, and the sensitivity and proximity of surrounding human and ecological receptors to construction activities.

6.6.12 In accordance with the IAQM's dust from construction and demolition guidance[77] as detailed in Table 6.2, the assessment will consider the potential for dust impacts at human receptors and ecological receptors.

6.6.13 The dust risk associated with dust soiling, PM_{10} human health impacts and ecological impact as a result of the dust magnitude and sensitivity of receptors will be determined using the IAQM risk of dust impacts tables.

6.6.14 Appropriate mitigation measures, as stipulated within the IAQM guidance, would be proposed, based on the conclusions of the assessment. The significance of dust effects will then be established using professional judgement taking into consideration the adoption of the mitigation measures.

Air quality neutral assessment

6.6.15 GLA's London Plan Guidance (Air Quality Neutral) sets out guidance on how an 'air quality neutral' assessment should be undertaken and aims at ensuring that new developments meet this status. An air quality neutral development is one that meets the building emissions benchmarks and the transport emissions benchmark for its assigned land use. Building emissions is generated due to supply of heat and energy while transport emissions is generated from additional car and light good vehicles used by the development.

6.6.16 However, this Project is an excluded development as the guidance states that "Developments, including major developments which do not include additional emissions sources are assumed to be Air Quality Neutral and do not need an Air Quality Neutral assessment. This would include, for example, developments that have no additional motor vehicle parking, do not lead to an increase in motor vehicle movements, and do not include new combustion plant such as gas-fired boilers." During the operation of the Project, there are no additional motor vehicle movement, no additional vehicle parking and no proposed combustion plant. Furthermore, there is no benchmark for this type of project. Therefore, this Project is assumed to be air quality neutral. The guidance notes that the assessment of any other additional vehicle trips should be captured in the wider air quality impact

assessment. The process for the wider air quality impact assessment is provided in this scoping report.

Air quality positive

6.6.17 The GLA has published a guidance to ensure large-scale developments deliver maximum air quality benefits and improvements and incorporate good practice and design measures to reduce exposure to air pollution as far as possible. An Air Quality Positive Statement will be included in the assessment which will set out the inherent measures included within the Project design.

6.7 Mitigation

6.7.1 As a minimum, it is anticipated that good practice dust mitigation measures to ensure minimal dust emissions such as proper site management, maintenance of the site and machinery used on-site, waste management and measures to reduce dust emissions from demolition, earthworks, construction and trackout as described in the IAQM guidance would be applicable during the construction phase. Examples of some of these measures are listed below:

- Planning site layout so that machinery and dust causing activities are located away from receptors, as far as is possible
- Ensuring an adequate water supply for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate
- Reuse and recycle waste to reduce dust from waste materials
- Ensure vehicles entering and leaving sites are securely covered to prevent escape of materials during transport, and
- Avoiding site runoff of water or mud

6.7.2 In addition, to reduce vehicle emissions from construction vehicles, all vehicles should switch off engines when stationary – no idling. Further mitigation measures relevant to management of construction vehicles and any associated air quality or dust effects would be identified with a Code of Construction Practice (CoCP).

6.8 Summary of Scope for the EIA

6.8.1 Operational air quality effects from changes in traffic attributed to the completed Project are not likely to be significant. Odour emissions due to the operation of the TTP are also not likely to be significant. Both operational traffic and odour impacts are therefore proposed to be scoped out from further assessment, with justification provided in paragraphs 6.5.9 and 6.5.10, respectively and in Appendix D Odour Technical Note. The scoping

out of a requirement to provide an Air Quality Neutral assessment is also proposed.

6.8.2 A summary of impact pathways to be scoped in or out of the assessment in the ES is provided in Table 6.5. It is proposed that the air quality assessment undertaken as part of the ES will consider the following key issues:

- impact of fugitive dust emissions from construction activities (i.e., earthworks, shaft construction, trackout, tunnelling, storage and handling of spoil, and
- impact of exhaust emissions to air from additional construction traffic on the local road network, construction plant (non-road mobile machinery on haul routes) and associated generators and combustion plant during the construction phase

6.8.3 In addition, an air quality positive statement will be undertaken in accordance with Policy SI 1 (Improving air quality) of the London Plan.

Table 6.5 Summary of the scope for air quality

Local planning authority area	Potential sensitive receptors	Potential impact	Potential effect Scoped In/Out
Construction			
LBH, LBR and RBK	Ecological receptors	Vehicle exhaust emissions	IN
		Non-road mobile machinery, generator and combustion plant emissions	IN
		Dust	IN
	Human receptors (i.e., residential properties, schools)	Vehicle exhaust emissions	IN
		Non-road mobile machinery, generator and combustion plant emissions	IN
		Dust	IN
		Odour	OUT
Operation			
LBH, LBR and RBK	Ecological receptors	Vehicle exhaust emissions	OUT
	Human receptors (i.e., residential properties, schools)	Vehicle exhaust emissions	OUT
		Odour	OUT

7 Noise and Vibration

7.1 Introduction

7.1.1 Noise and vibration can have an effect on the environment and on the quality of life enjoyed by individuals and communities. They may in certain circumstances lead to effects on human, ecological and infrastructure receptors. Potential noise and vibration effects are therefore considered during the Environmental Impact Assessment (EIA) scoping process.

7.1.2 This chapter considers the potential for the following activities to give rise to noise and vibration effects and should be read in conjunction with the description of the Project as presented in Chapter 2 The Project:

- Construction activity within the working areas as described in Chapter 2 The Project, including areas at Mogden Sewage Treatment Works (STW), shaft locations along the conveyance tunnel and pipeline routes, construction compounds, outfall and intake locations
- Construction vehicle movements on public highways
- Construction river freight movements on public waterways, and
- Operation of the proposed tertiary treatment plant (TTP), conveyance tunnel, pipeline, and outfall and intake infrastructure

7.1.3 The likely effects associated with each of these activities on human receptors (at dwellings, schools, hospitals, places of worship, recreational areas, and other noise-sensitive locations) are considered within this chapter. Effects of noise and vibration on other receptors are considered where relevant in the following chapters:

- Chapter 8 Historic Environment – considers historic receptors such as Listed Buildings
- Chapter 9 Terrestrial Ecology and Chapter 10 Aquatic Ecology – consider ecological receptors within designated sites, and designated/protected species, and
- Chapter 12 Townscape and Visual Amenity – considers any areas of tranquillity

7.1.4 In this chapter, in line with current legislation, references to ‘noise’ can apply equally to the assessment of vibration impacts.

7.2 Consultation and Engagement

7.2.1 Non-Statutory Public Consultation was undertaken from October 2023 to December 2023 to seek feedback about the site options for the Project from a variety of stakeholders such as landowners, residents, businesses, local authorities, and other statutory bodies who might be affected by or interested in the Project.

7.2.2 In relation to noise and vibration the responses tended to be general, relaying concerns about potential noise pollution and vibration disturbance during construction from additional traffic and also construction activities. The concerns about an increase in noise were mainly with regard to the proposed shaft locations at Moormead Recreational Ground and Ham Lands, locations that no longer form part of the Project. There were also some concerns about operational noise from the Project, including that from the Mogden STW site.

7.2.3 Specific responses from the three Local Planning Authorities (LPAs) were received, with the only mention of noise being from the London Borough of Hounslow (LBH), who responded *"Homes opposite the site [Ivybridge Retail Park] and along the road used for construction traffic would be impacted by noise and pollution levels this would be detrimental to the residents health - both physical and mental"*. The shaft location at Ivybridge Retail Park, which was proposed when the scheme was considering a pipejacking construction method for the recycled water conveyance route, no longer forms part of the Project.

7.2.4 On 16 July 2024, further engagement occurred with representatives from London Borough of Richmond upon Thames (LBR), Royal Borough of Kingston Upon Thames (RBK), and LBH via video link. The Project team outlined the baseline noise monitoring locations, baseline methodology, and proposed assessment methodology. The Project team also outlined which matters relating to noise and vibration were proposed to be scoped in and which were proposed to be scoped out. There were no questions raised from the representatives of the local authorities present.

7.2.5 The local authorities will be notified of likely dates for any proposed baseline noise surveys in their area and to request comments regarding the proposed survey locations and durations.

7.3 Legislation and Policy Review

7.3.1 Key policy relevant to noise and vibration is set out in the National Policy Statement (NPS) for Water Resources Infrastructure[78]. Section 4.11 of the NPS provides guidance on the assessments and planning requirements that the applicant should meet with respect to noise and vibration. These include:

- Factors that will determine the likely noise impact of the proposals
- The components of the noise assessment to be included in the Environmental Statement (ES)
- Prediction, assessment and management techniques
- Mitigation measures
- Policy compliance requirements

7.3.2 In addition to the policy set out in the NPS the Project would also have regard to the relevant key legislation, policy and guidance as presented in this section. Reference is also made Table 7.1 in this section to British Standards and other guidance documents that have also been used to inform the proposed scope of the noise assessment.

7.3.3 A detailed summary of the legislative, policy and guidance framework for this aspect, and how it accords with the Project would be provided in the Preliminary Environmental Information (PEI) Report and/or ES.

Table 7.1 Relevant legislation, policy and guidance

Relevant legislation, policy and guidance
Legislation
Environmental Protection Act (EPA) 1990 Part III[79]
Control of Pollution Act (COPA) 1974[80]
Planning Act 2008[81]
National policy
NPS for Water Resources Infrastructure[82]
The National Planning Policy Framework (NPPF) 2023[83]. It is noted that the NPPF (2024) was under consultation until September 2024
The Noise Policy Statement for England (NPSE)[84]
Planning Practice Guidance for Noise[85]
The Environmental Noise Directive (END)[86]
Department for Environment, Food and Rural Affairs (Defra) Noise Action Plan: Roads[87]
Local policy
The London Plan 2021[88], Policies D13 and D14
The LBH Local Plan 2015 - 2030[89], Policy EQ5 and the LBH Local Plan 2020 - 2041 (emerging policy)
The LBR Local Plan 2015 - 2018[90], Policy LP10 and the LBR 'Pre-Publication' Draft Local Plan (2024)[91], Policy 53 The LBR Supplementary Planning Document for Development Control for Noise Generating and Noise Sensitive Development (September 2018)[92] The LBR Construction Code of Practice[93]

Relevant legislation, policy and guidance
The RBK Core Strategy 2012[94], Policies CS1, DM1, DM10, and Kingston's Local Plan 2019 - 2041 (emerging policy)[95]
Guidance
British Standards (BS) 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise[96]
BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration[97]
BS 6472:2008 Guide to evaluation of human exposure to vibration in buildings[98]
BS 7385-2:1993 Evaluation and measurement for vibration in buildings - Part 2: Guide to damage levels from groundborne vibration[99]
BS 7445:2003 Description and measurement of environmental noise[100]
BS 8233:2014 Guidance on sound insulation and noise reduction for buildings[101]
BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound[102]
The Calculation of Road Traffic Noise (CRTN) document[103]
Design Manual for Roads and Bridges (DMRB) - Sustainability and Environment Appraisal LA 111 - Noise and Vibration [104]
Guidelines for Community Noise (GCN)[105]
Night Noise Guidelines (NNG) for Europe[106]
Environmental Noise Guidelines for the European Region[107]
The Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment[108]
Measurement and Assessment of Groundborne Noise and Vibration[109]
International Organisation for Standardisation (ISO) 9613-2 Acoustics — Attenuation of sound during propagation outdoors, Part 2: Engineering method for the prediction of sound pressure levels outdoors[110]
A Guide to the Measurement and Prediction of the Equivalent Continuous Sound Level, Leq[111]
Ground Vibration Caused by Civil Engineering Works[112]
Legislation and Practice on Noise and Vibration Control with particular relevance to Piling[113]
Groundborne vibration caused by mechanised construction works -TRL Report 429[114]

7.4 Existing Environment and Baseline Conditions

Study areas

7.4.1 Separate study areas are defined below for each element of the noise and vibration assessment. The EIA Scoping Boundary is shown in Plan 1.1 in Appendix A. All sites that form part of the Project have been considered, and thus study areas have been identified within the areas of all three LPAs. Based on the assessment of impacts on receptors within these study areas during the impact assessment stage, consideration will be given to the likelihood of significant effects outside these areas, and the study areas will be extended where relevant. Consideration of potential effects of noise and vibration on aquatic ecology is considered in Chapter 10 Aquatic Ecology.

Construction noise and vibration assessment

7.4.2 Following guidance in BS 5228-1, the study area (for both the scoping and impact assessment stages of the EIA process) for the construction noise assessment is 300m from any construction activity, or the area within which sound levels from the Project are forecast to give rise to potential impacts, whichever is the greater.

7.4.3 The study area (for both the scoping and impact assessment stages of the EIA process) for the construction vibration assessment is 100m from any construction activity, or the area within which vibration levels from the Project are forecast to give rise to potential impacts, whichever is the greater.

Construction road traffic noise and vibration

7.4.4 The construction traffic noise study area is defined as 50m from the carriageway edge of public roads with the potential for an increase in basic noise level (BNL) of 1dB(A) or more. These routes will be determined on review of the data which will be generated by the Transport Assessment presented in Chapter 18. The procedure for calculating a BNL is set out by the CRTN document and relates to a noise level at a reference location 10m from the carriageway edge.

7.4.5 For construction traffic vibration, the study area is based upon guidance presented by TRRL, which indicates that a 'Heavy lorry on a poor road surface' would result in groundborne vibration levels (peak particle velocity (PPV)) of less than 1mm/s at a distance of approximately 2m and approximately 0.3mm/s at a distance of approximately 4m. The study area is defined as 4m from the carriageway edge of any route used by HGVs. The construction traffic vibration study areas will be confirmed once the relevant routes have been confirmed.

Construction river traffic noise

7.4.6 In the absence of any guidance on study areas for the assessment of noise from river freight movements using the River Thames, the study area adopted for the purposes of this EIA Scoping Report is similar to that defined for road traffic, i.e. 50m from the riverbank where it is considered likely that the noise from additional river traffic will be above existing levels.

7.4.7 River freight movements are not considered likely to be sources of potentially significant vibration effects.

Operational noise

7.4.8 There is no current authoritative guidance that limits how far the noise study area should extend from the operational noise sources intended as part of the Project. The study area required for operational noise sources will be led by the noise emission level from those sources (a low noise emission level would result in a small study area, whereas a higher noise emission level would result in a larger study area) and also the existing noise climate in the area. It is anticipated that the most common receptor type with the potential to be affected by operational noise is residential. In line with good practice and in the absence of any specific distance to define a study area, the study area will include the nearest residential receptors to the sites as a minimum and will be kept under review and extended if necessary to ensure the full extent of any significant effects is fully characterised.

Baseline noise levels

7.4.9 To inform this EIA Scoping Report, reference has been made to OS mapping and the strategic noise mapping undertaken by Defra, to satisfy the requirements of the Environmental Noise Directive. These results Extrium 2023[115] have been used to provide a high-level description of existing traffic and rail noise levels at receptors in parts of the study areas covered by the strategic noise mapping. In addition, the air noise contours for Heathrow airport have also been reviewed.

7.4.10 Baseline noise levels in the areas surrounding the proposed shafts and structures are likely to vary with locations which range from semi-rural to those near busy urban roads. The main factors that affect baseline noise levels are expected to be as follows:

- Higher noise levels would be expected at locations closer to transport infrastructure and existing industrial sources
- Diurnal patterns – higher noise levels would be expected at times of peak transport activity and lowest at night, and
- Meteorological conditions – noise levels would be at their lowest in the absence of wind and rain

7.4.11 Certain receptors with the potential to be affected by the Project may also be affected by noise from sources included in the strategic noise mapping, such as:

- A310 Twickenham Road/London Road
- A316 Chertsey Road
- A305 York Street/Richmond Road
- Arragon Road
- A307 Richmond Road, and
- South Western Railway near Twickenham Station (Waterloo to Reading/Windsor and Hounslow/Kingston Loop)

7.4.12 The noise maps indicate that noise levels at some receptors in the vicinity of these roads and railway could be above 55dB $L_{Aeq,16h}$, and/or above 50dB L_{night}.

7.4.13 As part of the strategic noise mapping, Defra has produced a list of Noise Important Areas (NIA), identified as areas requiring action to reduce noise levels. Various NIAs have been designated on the road networks local to the site, with the nearest to the EIA Scoping Boundary located at A316 The Avenue (NIA ID 616), and at A305 King Street (NIA ID 615).

7.4.14 The Mogden STW site lies within the 60dB $L_{Aeq,16\ hour}$ actual modal split air noise contour for 2019[116], and within the 54dB $L_{Aeq,16\ hour}$ actual modal split air noise contour for 2021[117], indicating that the existing noise environment will be influenced by air noise from Heathrow. The remaining sites which form part of the Project lie outside of recent aircraft noise contours.

Baseline vibration levels

7.4.15 In the majority of locations adjacent to the Project, no existing appreciable level of vibration exists and therefore an absolute criterion is proposed. In certain locations, such as those close to an existing road with imperfections in the surface, a change-based criteria may be more appropriate. This approach is consistent with the vibration assessment of other major infrastructure schemes.

7.5 Sensitive Receptors and Potential Environmental Effects

Sensitive receptors

7.5.1 The DMRB LA 111 provides various examples of noise sensitive receptors:

‘Examples include dwellings, hospitals, healthcare facilities, education facilities, community facilities, END quiet areas or potential END quiet areas, international and national or statutorily designated sites, public rights of way and cultural heritage assets.’

7.5.2 The IEMA 'Guidelines for Environmental Noise Impact Assessment' (2014) details additional noise sensitive receptor types, including:

- Places of worship
- Open-air amenities
- Cemeteries
- Farms and kennels
- Retail premises, and
- Some commercial and industrial installations

7.5.3 In addition to above sensitive receptor types, flood defences are considered as further potential sensitive receptors relevant to this Project.

7.5.4 The nearest sensitive receptors within the EIA Scoping Boundary have been identified particularly in proximity to the TTP, shafts and other infrastructure proposed. It should be noted that the distances to the shaft sites, TTP and operational infrastructure are expected to be greater than noted below, as they would be positioned within the site boundaries.

- Mogden STW Western Work Area and drive shaft: residential properties on Harvesters Close and surrounding roads approximately 80m to the west
- Mogden STW Eastern Work Area and interception shaft: residential properties on Hillary Drive approximately 50m to the east and Beaumont Place approximately 60m to the south
- Ham Lands intermediate shaft site: residential property at Ham House Stables approximately 100m east of Ham Playing Fields site or in excess of 150m south of the Ham Street Car Park site
- Burnell Avenue reception shaft site: residential properties 10m north on Burnell Avenue
- Thames Lee Tunnel (TLT) connection shaft south of Northweald Lane: residential properties approximately 10m northeast on Northweald Lane
- TLT connection shaft at Tudor Drive: residential properties on Tudor Drive directly adjacent to the east

Potential environmental effects

7.5.5 A preliminary review of the potential impacts at receptors within the identified study areas has been carried out. This relates to construction noise, construction vibration, construction road and river traffic and operational noise and vibration.

7.5.6 The assessment of impacts from noise and vibration has been undertaken in consideration of noise effect levels that have been introduced into English noise policy by the NPSE. These effect levels are defined as:

- LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected

- SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur

7.5.7 The NPSE does not assign decibel values to these effect levels as they will vary depending upon the type of assessment being undertaken. However, suggested effect levels for construction noise and vibration and operational noise are contained within DMRB LA 111 for some aspects, and these have been referred to where appropriate.

Construction effects

7.5.8 Construction activity will occur at the TTP, shaft sites, within compound areas and at the intake and outfall structure sites. The conveyance tunnel and pipeline are underground, hence the potential for airborne noise generating activities would be limited to these sites but would affect all three LPAs' areas.

7.5.9 The equipment associated with the above works could include dumpers, tracked excavators, hydraulic breakers, telescopic handlers, lorries, dozers, cranes, compressors, generators, Tunnel Boring Machine (TBM), drill rigs, slurry plant and pumps. Sheet piling is proposed at some locations including at the drive shaft site. Where possible a 'push-in' method rather than impact or vibrating method would be used to reduce the potential for noise and vibration effects. It is not expected that the various construction activities would occur at all sites simultaneously, but the program would be reviewed at the time of assessment to confirm this.

7.5.10 The majority of construction activity is expected to be undertaken during daytime working hours. However, at the present time, the need to undertake some works outside of daytime hours cannot be discounted. Tunnel construction usually requires the continuous operation of the TBM and therefore 24-hour working is assumed for this activity. During this period, HGV movements will be restricted but spoil removal from the tunnel would be required.

7.5.11 In addition to potential airborne noise and vibration effects from all construction activities, there is the potential for tunnelling activities to result in groundborne noise and vibration effects. Based upon data from similar projects, these are not anticipated to be significant. However, they remain scoped into the assessment until further information is available concerning ground conditions and tunnelling methods selected.

7.5.12 The tunnel will pass below flood defences, including two walls on the River Crane and a wall and embankment on the River Thames. However, the Project is not expected to impact the flood defences due to the depth, tunnel design and utilisation of good construction practices.

7.5.13 The additional road traffic movements required to transport personnel, materials and equipment to and from the various work sites have the potential to increase noise levels at receptors close to relevant parts of the public highway network. Based upon the traffic data presented in section 2.4 in Chapter 2 The Project and using a method based upon 'A Guide to the Measurement and Prediction of the Equivalent Continuous Sound Level, L_{eq}' (The Noise Advisory Council, 1978), it is predicted that the noise generated by additional road traffic movements would be below the LOAEL of 55dB $L_{A10,18h}$ facade set out by DMRB LA 111 for the operational effects of highways projects. Taking this into account along with the temporary nature of construction traffic, it is concluded that significant adverse traffic noise effects are unlikely during daytime periods. Additional night-time HGV traffic is not anticipated at this stage. DMRB LA 111 also states that a maintained road surface should be free from irregularities, assuming that all relevant roads are adequately maintained, vibration from traffic using the highway should not have the potential to lead to significant adverse effects.

7.5.14 Additional tug and barge movements transporting materials on the river may have the potential to increase noise levels at receptors close to relevant parts of the river network. These potential effects remain scoped in until further information is available concerning the use of and any number and timing of river vessel movements.

Operational effects

7.5.15 During the operational phase, noise would be generated by the use of new equipment at the TTP, and at the outfall and intake sites. Any transformers included as part of the proposed substation units at the intake and outfall above-ground infrastructure are assumed likely to result in negligible noise effects at all off-site receptors. This is based upon observations made at existing pumping stations, and that the substations can be located and acoustically insulated to mitigate any potential for significant effects. Any emergency generators would be tested on a monthly basis, which would be expected to be completed within approximately 30 minutes during daytime hours, and only used in an emergency to ensure water supplies are maintained during any power outage and are therefore scoped out.

7.5.16 The pumps at the pumping stations with balanced rotating equipment have the potential to be sources of vibration. However, as the pumps would be located on concrete bases with suitable isolation, any vibration transmitted into the ground is likely to be negligible, and at orders of magnitude lower than would be expected to give rise to nuisance or damage to properties.

7.5.17 Valves are usually located within concrete chambers, which are likely to be below ground. These valves are not considered likely to generate sufficient noise to be perceptible at local receptors.

7.5.18 Since the water recycling conveyance tunnel and river water pipeline are both below ground, noise from the flow of water within these conveyance routes is considered unlikely to be perceptible at receptor locations. The proposed tunnel would be designed and operated in accordance with industry good practice. This rigidity of the tunnel walls is expected to ensure that fluid flow would be smooth enough that vibration issues associated with turbulent flow would be avoided.

7.5.19 Additional traffic movements required during the operational phase of the Project are considered likely to be small scale and intermittent and therefore, they would not have the potential to result in significant noise and vibration effects.

Decommissioning

7.5.20 Given the Project is a drought resilience scheme that comprises an infrastructure project for the supply of water for distribution and future treatment to the public, it is assumed that the Project will be operated within its operational parameters indefinitely. It is, therefore, proposed to scope out decommissioning out of the assessment. Further details and justification of this can be found in Chapter 5 EIA Methodology, paragraphs 5.6.22 to 5.6.24.

7.6 Assessment Methodology

Further baseline data gathering

7.6.1 The DMRB LA 111 states that:

'Noise monitoring, specifically for the purposes of construction noise baseline data collection, should only be undertaken where data from other sources is not sufficient to enable production of a proportionate construction noise assessment'.

7.6.2 The review of available baseline data reported in section 7.4 indicated that whilst data is available for locations near to main roads and railways, and within the Heathrow airport noise contour area, no data is available for much of the study area. A targeted baseline noise survey is proposed to supplement the noise mapping data and support the construction noise assessment.

7.6.3 The proposed method for the assessment of construction noise is based on methods set out in Annex E.3.2 of BS5228-1:2009+A1:2014 and LA 111. These methods use baseline noise levels to set assessment criteria. The survey would include day, night, weekday and weekend periods. Monitoring would be undertaken at locations selected to be representative of the closest potentially affected noise sensitive receptors to the main works areas within the Project and each of the three LPAs would be engaged regarding the

details of the proposed survey methodology prior to any surveys being undertaken.

7.6.4 No baseline vibration survey is proposed to support the construction vibration assessment. Following guidance in DMRB LA 111, the vibration baseline shall be assumed to be zero.

7.6.5 For operational noise, a baseline noise level survey would be undertaken at locations representative of noise sensitive receptors in the vicinity of the TTP and intake/outfall sites. The survey would include both daytime and night-time and cover weekday and weekend periods. The relevant LPA would be consulted regarding the details of the proposed methodology prior to any surveys being undertaken.

Assigning sensitivity

7.6.6 Both DMRB LA 111 and the IEMA 'Guidelines for Environmental Noise Impact Assessment' (2014) note that receptors may have various sensitivities to noise, but do not specifically define a sensitivity scale.

7.6.7 Many of the guidance documents cited above present different assessment criteria for different receptor types. The sensitivity of receptors has therefore been considered when selecting the assessment criteria used to describe the magnitude of impact. It is therefore not necessary to define a separate sensitivity scale for noise receptors.

7.6.8 Sensitive receptor types for noise and vibration are identified in section 7.5. For vibration, unoccupied buildings within the vibration study area are also considered to be potentially sensitive.

7.6.9 For the purposes of assigning significance, sensitive receptors for noise and vibration align with a 'High' value as described within Table 5.2 of Chapter 5 EIA Methodology.

Assigning magnitude

Construction phase

7.6.10 The construction of the Project will be assessed on a monthly basis throughout the construction period.

7.6.11 Where the predicted construction level exceeds the relevant SOAEL values then a likely significant adverse effect will be reported for each receptor affected.

7.6.12 For residential receptors, likely significant adverse effects (positive from noise reductions and negative from noise or vibration increases) will also be determined on a community basis where the calculated level exceeds the

relevant LOAEL but is less than the relevant SOAEL values by taking into account the following factors:

- Type of effect being considered (e.g. annoyance)
- The magnitude of the effect (i.e. the calculated noise or vibration level compared to the relevant LOAEL and SOAEL values and available dose-response information)
- Change in vibration level, where relevant
- The assessment category
- The existing sound environment in terms of the absolute level and the character of the existing environment
- The number and grouping of receptors subject to noise effect and noise change
- Any unique features of the Project or the receiving environment
- The potential combined impacts of sound and vibration
- The frequency and duration over which temporary construction impacts may occur, and
- The effectiveness of mitigation through design or other means

7.6.13 For non-residential receptors, significant effects will be determined on a receptor-by-receptor basis taking into account:

- The use and sensitivity of the receptor
- The type of effect being considered
- The magnitude of the impact
- The design of the receptor affected
- The existing ambient sound and vibration levels in the receptor affected
- The potential combined impacts of airborne sound, ground-borne sound and vibration
- Any unique features of the Projects' sound or vibration impacts in the area being considered (which may require secondary acoustic indicators/criteria)
- The frequency and duration over which temporary construction impacts may occur, and
- The effectiveness of mitigation through design or other means

Construction airborne noise

7.6.14 Airborne construction noise levels would be predicted at selected receptors within the 300m study area based upon guidance presented by BS5228-1. Noise modelling software or verified bespoke spreadsheets would be used to implement the BS5228 calculation methodology.

7.6.15 Table 7.2 is based upon the example threshold for a potential significant effect at dwellings presented in Table E.1 of BS 5228-1 (BSI, 2014a). These noise thresholds have been adopted as the LOAEL values for the assessment of construction noise at residential properties. The Category C

threshold values, or the ambient noise level, whichever is the higher, has been adopted as the SOAEL values for the assessment of construction noise at residential properties. During the day, evening or night, a construction noise adverse effect on a receptor will be identified where the impact of the Project is greater than the relevant assessment category value. This approach is consistent with other major infrastructure schemes including High Speed 2 and Thames Tideway Tunnel.

Table 7.2 Construction airborne noise LOAELs and SOAELs for residential receptors

Time period	LOAEL	SOAEL		
		Category A(A)	Category B(B)	Category C*(C)
Day (07:00-19:00 weekday and 07:00-13:00 Saturdays)	Baseline noise levels $L_{Aeq,T}$	65dB $L_{Aeq,T}$	70dB $L_{Aeq,T}$	75dB $L_{Aeq,T}$
Night (23:00-07:00)	Baseline noise levels $L_{Aeq,T}$	45dB $L_{Aeq,T}$	50dB $L_{Aeq,T}$	55dB $L_{Aeq,T}$
Evening and weekends (time periods not covered above)	Baseline noise levels $L_{Aeq,T}$	55dB $L_{Aeq,T}$	60dB $L_{Aeq,T}$	65dB $L_{Aeq,T}$

A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

(B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

(C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

Note 1: A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

Note 2: If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3dB due to site noise.

7.6.16 The magnitude scale, and LOAEL and SOAEL methodology set out above are applicable to the range of receptors presented. Should other receptor types or unusual local circumstances be identified, reference would be made to other absolute noise criteria such as those presented by BS8233 and the WHO GCN.

Construction groundborne noise

7.6.17 The prediction and assessment of groundborne noise would be undertaken with reference to The Association of Noise Consultants publication, '*Measurement and Assessment of Groundborne Noise and Vibration*' (AND,

2012). In addition, where necessary, and if sufficient data from ground investigations is available, predictions of groundborne noise would be undertaken using numerical modelling methods.

7.6.18 The magnitude criteria for groundborne noise are based upon current industry good practice, including assessments presented for projects such as High Speed 2, and are set out in Table 7.3.

Table 7.3 Construction groundborne noise LOAELs and SOAELs

Time periods	LOAEL	SOAEL
All time periods	35dB L_{ASmax}	45dB L_{ASmax}

7.6.19 The magnitude scale, LOAEL and SOAEL set out above are applicable to residential receptors. Should other receptor types or unusual local circumstances be identified, other SOAEL values may be set, such as:

- Theatres/large auditoria and concert halls – 25dB L_{ASmax}
- Sound recording/broadcast studios – 30dB L_{ASmax}
- Places of meeting for religious worship/courts/cinema/lecture theatres/museums/small auditoria or halls – 35dB L_{ASmax}
- Offices/schools/colleges/hospitals/hotels/libraries- 40dB L_{ASmax}

Construction vibration

7.6.20 Vibration from construction is assessed using the PPV metric and would be predicted at selected receptors within the study area based upon guidance presented by BS5228-2.

7.6.21 LA 111 and BS5228-2 have been used to determine the magnitude of construction vibration impacts for PPV. The magnitude scale adopted for the Project, along with the supporting LOAEL and SOAEL values required by the magnitude scale, are detailed in Table 7.4 and Table 7.5 respectively.

Table 7.4 Magnitude of impact and construction vibration descriptions, human response

Construction vibration magnitude of impact	Construction vibration level
Large	Above or equal to 10mm/s PPV
Medium	Above or equal to SOAEL and below 10mm/s PPV
Small	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL

Table 7.5 Construction vibration LOAELs and SOAELs

Time periods	LOAEL	SOAEL
All time periods	0.3mm/s PPV	1.0mm/s PPV

7.6.22 The magnitude scale, LOAEL and SOAEL set out above are applicable to the range of receptors described by DMRB LA 111 and detailed in paragraph 7.4.1 above. Should other receptor types or unusual local circumstances be identified, reference will be made to other vibration criteria such as those presented by BS5228-2 which are in turn based on guidance set out in BS7385-2 and BS6472.

7.6.23 DMRB LA 111 also recommends that the risk of structural damage due to construction vibration is also considered by reference to a fixed criteria set out in BS7385-2. Based upon BS7385-2, BS5228-2 and the professional judgement of the assessment team, the following criteria in Table 7.6 have been adopted:

Table 7.6 Construction vibration criteria to prevent cosmetic damage to buildings

Time periods	Impact criteria (PPV at building foundation)	
	LOAEL	SOAEL
Potentially vulnerable buildings[(a)]	6mm/s	3mm/s
Structurally sound buildings	12mm/s	6mm/s
(a) BS7385 highlights that the criteria for aged buildings may need to be lower if the buildings are structurally unsound. The standard also notes that criteria should not be set lower simply because a building is important or historic (listed). Properties shall be considered structurally sound, unless stated otherwise.		

7.6.24 If a numerical modelling based assessment is undertaken for groundborne noise associated with the tunnelling activities, this modelling would also be used to inform the prediction and assessment of groundborne vibration from tunnelling.

7.6.25 The assessment criteria that would be used for the finite assessment of tunnelling works, if needed, would be in terms of the Vibration Dose Value (VDV) for human response. The calculations would be undertaken with reference to ISO 14837-1, supplemented with precedent set by major infrastructure projects such as High Speed 2. The criteria given in Table 7.7 would apply when considering potential human response to vibration during tunnelling.

Table 7.7 Construction groundborne vibration VDV criteria for tunnelling (human response)

Receptor category	Groundborne vibration effect levels (measured indoors near but not at the centre of floors), VDV $ms^{-1.75}$	
	LOAEL	SOAEL
Residential	16h day: 0.2 8h night: 0.1	16h day: 0.8 8h night: 0.4
Schools/activity centres /places of worship	16h day: 0.4	
Hospice/care homes	16h day: 0.2 8h night: 0.1	

Road traffic noise during construction

7.6.26 The prediction of noise from construction traffic on local roads would be undertaken using the BS5228 methodology for construction traffic. The magnitude of impact is based on the level of change in road traffic noise and are set out in Table 7.8 and reproduces guidance presented in DMRB LA 111, with the exception of a no change magnitude.

Table 7.8 Magnitude of impact for road traffic noise during construction

Construction road traffic noise magnitude of impact	Increase in BNL of closest public road used for construction traffic (dB)
Large	Greater than or equal to 5.0
Medium	Greater than or equal to 3.0 and less than 5.0
Small	Greater than or equal to 1.0 and less than 3.0
Negligible	Greater than 0.0 and less than 1.0

River traffic noise

7.6.27 The prediction of noise from river tugs and barges would be undertaken using the BS5228 methodology for mobile plant. The magnitude of impact set out by Table 7.9 and Table 7.10 have been determined based upon guidance presented by BS8233 and the WHO GCN and WHO NNG guidelines. No source specific guidance is available for river vessels. The guidance documents used set out noise thresholds for environmental noise.

Table 7.9 Magnitude of impact for river traffic noise during construction

Construction noise magnitude of impact	Construction noise level
Large	Above or equal to SOAEL +5dB(A)
Medium	Above or equal to SOAEL and below SOAEL +5dB(A)
Small	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL

Table 7.10 River traffic noise LOAELs and SOAELs

Time period	LOAEL	SOAEL
Day (07:00-19:00 weekday and 07:00-13:00 Saturdays)	45dB $L_{Aeq,T}$	55dB $L_{Aeq,T}$
Night (23:00-07:00)	40dB $L_{Aeq,T}$	45dB $L_{Aeq,T}$
Evening and weekends (time periods not covered above)	40dB $L_{Aeq,T}$	50dB $L_{Aeq,T}$

7.6.28 The magnitude scale, LOAEL and SOAEL values set out above are applicable to residential receptors. Should other receptor types or unusual local circumstances be identified, reference would be made to other absolute noise criteria presented by BS8233 and the WHO GCN and WHO NNG.

Operational phase

7.6.29 Operational noise would be predicted using numerical methods to implement the ISO9613-2 calculation methodology. The magnitude scale to be used in the assessment of operational noise has been developed based upon guidance in BS4142. The scale to be used for residential receptors, and those of a similar sensitivity, is presented in Table 7.11. Should other receptor types or unusual local circumstances be identified, reference would be made to other absolute noise criteria such as those presented by BS8233 and the WHO GCN and WHO NNG.

Table 7.11 Magnitude of impact for operational noise

Operational noise magnitude of impact	Difference between background noise level and rating noise level in accordance with BS4142 (dB(A))
Large	More than +10
Medium	+5 to +10
Small	+5 to +0
Negligible	Below background

7.6.30 LOAEL and SOAEL values have not been defined for such sources as those generated by the Project, which are classed as Industrial Noise. A 2014 report undertaken for Defra entitled 'Possible options for the identification of SOAEL and LOAEL in support of the NPSE' states that:

'Given that there is insufficient robust information on people's response to industrial noise it is not possible to derive a LOAEL or SOAEL for industrial sources'.

7.6.31 The assessment of operational noise would therefore be undertaken using the magnitude scale developed based on guidance in BS4142. It should be noted that BS4142 emphasises that, along with the difference between a rating level and background noise level, contextual factors should also be considered. These include consideration of the absolute level of sound, the character of the existing noise environment and industrial noise source, and whether the receptor property includes any noise insulation, mechanical ventilation or acoustic screening measures. These contextual factors may be used to modify the magnitude of impact if required in the assessor's professional judgement.

7.7 Mitigation

7.7.1 Construction and operational noise and vibration mitigation measures that may be considered at the assessment stage are outlined below.

Construction phase mitigation

Primary

7.7.2 The works would be carried out in accordance with Best Practicable Means as defined in section 72 of the Control of Pollution Act 1974 and in accordance with the recommendations of BS5228 part 1 and part 2. This requires good practicable means to be employed for the control of noise and vibration levels through the management of plant, equipment, road and river traffic and site activities to ensure control of noise and vibration.

7.7.3 The importance of noise and its potential to affect those living and working nearby should be included in the general induction training for the site and specific training should be given to staff who will have responsibility for managing noise during construction. The construction mitigation measures will also be included in any construction management documentation identified to be needed at the assessment stage.

Secondary

7.7.4 Temporary screening between the construction work sites and noise sensitive properties, varying in height above ground level, depending on location and the construction activities to be mitigated.

Tertiary

7.7.5 The Project will develop and implement a noise and vibration control strategy to reduce construction noise and vibration effects at nearby receptors. Where appropriate, this may include agreeing noise and vibration limits at receptors. The strategy would be documented in a Code of Construction Practice (CoCP) and agreed with the LPA.

7.7.6 Consideration would also be given to applying for Prior Consents via section 61 of CoPA. Each application would contain the particulars of the works to be undertaken, the working methods, details of the plant proposed to undertake the works, noise (and vibration if relevant) predictions and the proposed noise-control measures. Applications would be submitted to the relevant LPA for consent. The aim of section 61 applications would be to establish that good practicable means have been employed to control noise emissions. The LPAs may attach conditions to each consent, where it is considered that additional measures are required.

Operational phase mitigation

Primary

7.7.7 Noise would be generated by various sources at the above ground infrastructure sites, including pumps, compressors and mechanical ventilation systems. As the detailed designs of the TTP and intake/outfall structures (including the pumping stations) continue to evolve, opportunities to reduce noise levels will be sought, and noise control measures implemented. This may include enclosures, barriers, muffling devices and vibration isolation measures.

7.7.8 Table 7.12 sets out the overriding principles of noise control (note, this would also be applicable for construction noise sources).

Table 7.12 Hierarchy of noise/vibration control

	Description
Preferred option	Remove noise source (e.g. change process)
	Replace the noise source (e.g. quieter equipment available)
	Manage the source (e.g. restrict operating times)
	Control at source (e.g. enclose the noise source, muffling devices, vibration isolators)
	Control the transmission path (e.g. erect a barrier)
Least favoured option	Control at receptor (e.g. secondary glazing)

Secondary

7.7.9 At this stage, no additional mitigation measures are considered necessary. However, additional mitigation measures may be identified during the noise and vibration assessment process.

Tertiary

7.7.10 At this stage, no tertiary mitigation measures have been identified. However, such measures would be presented, if necessary, during the preparation of the ES.

7.8 Summary of Scope for the EIA

7.8.1 Based on the above, Table 7.13 presents the potential noise and vibration impacts that are proposed to be scoped in or out of further assessment, along with the rationale for the choice.

Table 7.13 Noise and vibration impacts scoped in and out of further assessment

Potential effect	Scoped In/Out	Rationale
Construction phase		
Construction airborne noise	IN	Some construction activities would occur within close proximity to sensitive receptors (within the relevant study area), would take place for a prolonged period of time, and would involve the use of noisy plant and equipment. As such, the potential for significant airborne noise and vibration impacts cannot be discounted at this time.
Construction vibration	IN	
Groundborne noise and vibration from tunnelling	IN	Noise and vibration sensitive receptors are located within the study area for groundborne noise and vibration from tunnelling activities. As such, the potential for significant tunnelling noise and vibration impacts cannot be discounted at this time.
Construction road traffic noise and vibration	IN	There will be additional construction vehicles on the existing road network during the construction phase of the Project. Sensitive receptors are positioned within the construction traffic study area, as such, the potential for significant road traffic noise and vibration impacts cannot be discounted at this time.
Construction noise from river traffic	IN	If the River Thames is used for construction traffic then there would be additional river movements

Potential effect	Scoped In/Out	Rationale
		during the construction phase of the Project. Sensitive receptors are positioned within the river traffic study area, as such, the potential for significant river traffic noise impacts cannot be discounted at this time.
Operational phase		
Noise from the pumping station and intake/outfall structures	IN	The potential for significant noise impacts resulting from the operation of the pumping station and intake/outfall structures cannot be discounted at this time. An assessment of operational effects would be made at the closest sensitive receptors and the study area adjusted accordingly to ensure all potential significant effects are identified.
Operational vibration from pumping station and intake/outfall structures	OUT	Through the adoption of good practice design and vibration isolation methods for equipment within the pumping stations, transmission of groundborne vibration would not result in significant effects.
Noise from the operation of the TTP	IN	The use of the new TTP has the potential to generate noise at the nearby sensitive receptors. An assessment of operational effects would be made at the closest sensitive receptors.
Noise and vibration from the flow of water within the underground tunnel /pipeline	OUT	The tunnel and pipeline are to be located below ground and associated noise and vibration is considered unlikely to be perceptible at receptors.
Noise during emergency conditions	OUT	A typical emergency conditions, including the testing of emergency generators or the emergency discharge of water at the outfall at the River Thames, would occur infrequently. Where testing of equipment can be scheduled, it would be undertaken during daytime hours and for short durations.
Road traffic noise	OUT	The potential for significant road traffic noise impacts during the operational phase of the Project is unlikely due to the low numbers of vehicles expected and the current flows on the roads. This is therefore scoped out from further assessment.

8 Historic Environment

8.1 Introduction

8.1.1 This chapter describes the proposed scope of assessment in relation to cultural heritage and archaeology, collectively termed the Historic Environment. The chapter should be read in conjunction with the description of the Project as presented in Chapter 2 The Project. The Project has the potential to create effects on cultural heritage receptors (heritage assets), including potential setting effects upon designated and non-designated assets. The wider setting effects upon the landscape are considered in Chapter 12 Townscape and Visual Amenity.

8.1.2 The key issues to be considered are listed below:

- Loss or damage to archaeological remains, including deposits of geoarchaeological or palaeoenvironmental interest, within the Mogden Sewage Treatment Works (STW) site, intake/outfall sites and shaft locations including any areas of temporary land-take
- Impacts to heritage assets within the vicinity of the intake/outfall sites and shaft locations as a result of changes to their settings

8.2 Consultation and Engagement

8.2.1 Non-Statutory Public Consultation was undertaken from October 2023 to December 2023 to seek feedback about the site options for the Project from a variety of stakeholders, including landowners, residents, businesses, local authorities, and other statutory bodies who might be affected by or interested in the Project. In relation to the Historic Environment, the responses highlighted concerns surrounding construction impacts on designated heritage assets.

8.2.2 On 1 August 2024 and 15 August 2024, engagement was carried out with representatives from London Borough of Hounslow (LBH), London Borough of Richmond upon Thames (LBR) and Royal Borough of Kingston Upon Thames (RBK). On 12 August 2024 engagement was carried out with representatives from Historic England and the Greater London Archaeological Advisor Service (GLAAS). An earlier introduction to the Project was provided to Historic England in November 2022.

8.2.3 During the meetings, the Project team outlined the baseline environment in relation to the Historic Environment and proposed assessment methodology. The Project team also provided an outline of which aspects were proposed to be scoped in and which were proposed to be scoped out. During the meeting with Historic England a question was raised regarding the height of the proposed tertiary treatment plant (TTP) at the Mogden STW site and

whether it would be visible above the surrounding embankment and vegetation. In addition, Historic England highlighted the proximity of the Grade II* Ham House Registered Park and Garden to the Ham Playing Fields and Ham Street Car Park (intermediate shaft). A query was also raised by GLAAS regarding the need for any stabilisation measures in relation to the potential for subsidence caused by tunnelling activities affecting heritage assets. These matters have been considered as part of this assessment.

8.2.4 Following the meetings with Historic England and GLAAS, it is proposed to enter into a service level agreement to allow for pre-application engagement to continue. This will include provision of further information on the proposed tertiary treatment facility and details on the tunnelling methodology for their consideration as requested.

8.2.5 During the meeting with LBR, the LBR Conservation and Urban Design Officer requested that the Teddington Lock Conservation Area was included within the baseline presented. Specific mention of the Teddington Lock Conservation Area has been made within this chapter as requested by the LBR officer.

8.3 Legislation and Policy Review

8.3.1 Key policy relevant to the Historic Environment set out in the National Policy Statement (NPS) for Water Infrastructure[118] includes:

- Paragraph 4.8.3. covers the value of heritage assets and the aspects which combine to arrive at the significance
- Paragraph 4.8.5 explains that some non-designated archaeological remains might be of equivalent value to a nationally significant scheduled monument
- Paragraphs 4.8.7 to 4.8.10 set out the need to assess a project's capacity to change the Historic Environment through Environmental Impact Assessment (EIA), reaching conclusions on asset value, identifying significant effects and managing change through design
- Paragraphs 4.8.11 to 4.8.14 set out the approach to mitigation
- Paragraphs 4.8.15 to 4.8.29 focus on the Secretary of State's (SoS) decision-making on a Development Consent Order (DCO) application and the conservation of heritage assets, irrespective of the levels of harm ascribed in assessment, as well as the way in which asset preservation is weighed against the public benefits of the project in question

8.3.2 In addition to the policy set out in the NPS for Water Resources Infrastructure, the Project will also have regard to other relevant legislation, policy and guidance for this aspect as listed in Table 8.1.

8.3.3 A detailed summary of the legislative, policy and guidance framework for this aspect, and how the Project accords with it will be provided in the Preliminary Environmental Information (PEI) Report and/or Environmental Statement (ES).

Table 8.1 Relevant legislation, policy and guidance

Relevant legislation, policy and guidance
Legislation
Planning Act 2008
Planning (Listed Building and Conservation Areas) Act 1990
Hedgerows Regulations 1997
National policy
NPS for Water Resources Infrastructure 2023[119]
The National Planning Policy Framework (NPPF) 2023[120] Chapter 16 conserving and enhancing the historic environment. It is noted that the NPPF (2024) was under consultation until September 2024
Regional and local policy
The London Plan 2021[121]
The LBH Local Plan 2015 - 2030[122] and the LBH Local Plan 2020 - 2041 (emerging policy)
The LBR Local Plan 2015 - 2018[123] and the LBR 'Pre-Publication' Draft Local Plan (2024)[124]
The RBK Core Strategy 2012[125] and Kingston's Local Plan 2019 - 2041 (emerging policy)[126]
Guidance
Planning Practice Guidance on the Historic Environment 2019 (UK Government)[127]
The LBR Supplementary Planning Guidance on Conservation Areas[128]

8.3.4 Combined, the legislation and policies associated with the historic environment aims to protect and conserve designated heritage assets as well as non-designated heritage assets, including archaeological remains, from harm.

8.4 Existing Environment and Baseline Conditions

Study area

8.4.1 A 500m study area around key above ground infrastructure sites comprising: Mogden STW (drive shaft, interception shaft and TTP); Ham Playing Fields and Ham Street Car Park (intermediate shaft); Burnell Avenue (reception shaft, connection shaft, outfall and intake); land south of Northweald Lane ((Thames Lee Tunnel (TLT) connection shaft); and Tudor Drive (TLT connection shaft)) (hereafter the 'study area') has been used to identify heritage assets that could be affected by the Project.

8.4.2 The study area is considered appropriate to capture all heritage assets that could be affected, either physically or as a result of changes to their settings, considering the nature of the Project. The study area is also considered to provide a sufficient sample to assess the potential for previously unknown archaeological assets to be present, also referred to as archaeological potential. The extent of the study area is in accordance with the recommendations provided by the Greater London Historic Environment Record (GLHER).

8.4.3 The following sources have been consulted to provide the baseline:

- Information on nationally designated sites from Historic England's National Heritage List for England (NHLE);
- GLHER as held by GLAAS;
- Details of Archaeological Priority Areas (APAs) as held by GLAAS; and,
- Information on locally or regionally designated sites, for example Conservation Areas and Locally Listed Buildings, as available from the respective London Boroughs

8.4.4 Plan 8.1 in Appendix A Plans shows the designated heritage assets in relation to above ground sites and the study area. The study area does not extend around the tunnelled elements of the Project as there is limited potential for impacts on heritage assets due to the depth of the tunnels and as a result of the tunnelling being undertaken through London Clay which has no archaeological interest or potential.

8.4.5 Land stability issues, such as subsidence, which could result in effects to heritage assets on the surface will be investigated as part of the ongoing ground investigation for the Project and assessed by the design team. The findings and conclusions on land stability from the subsequent Ground Investigation Report, and associated reports, will be summarised in the ES.

National designations summary

8.4.6 There are no World Heritage Sites, Scheduled Monuments or Historic Battlefields present within the study area.

8.4.7 There are 95 Listed Buildings within the study area. These comprise two Grade I Listed Buildings (Ham House (NHLE 1080832) and Orleans House (NHLE 1250280)), 11 Grade II* Listed Buildings, and 82 Grade II Listed Buildings. Most of the Listed Buildings fall within three main clusters including:

- Twickenham Riverside Conservation Area which is located on the north bank of the River Thames, north of Ham Street Car Park (intermediate shaft site), and contains 43 Listed Buildings;
- Ham House Conservation Area which is located in the central part of the study area to the immediate east of the proposed Ham Playing Fields and Ham Street Car Park (intermediate shaft sites), and contains nine Listed Buildings; and,
- Ham Common and Parkleys Estate Conservation Areas which are located at the southern end of the study area, approximately 370m northeast of land to the south of Northweald Lane and approximately 130m north and northeast of the Tudor Drive site and contains 30 Listed Buildings

8.4.8 In the central part of the study area, three Registered Parks and Gardens (RPG) are present including:

- Grade II* Ham House (NHLE 1000282) which is located to the immediate south and east of the Ham Playing Fields and Ham Street Car Park (intermediate shaft sites)
- Grade II* Marble Hill (NHLE 1000400) which is located on the north bank of the River Thames within the Twickenham Riverside Conservation Area in the central part of the study area, approximately 250m to the northeast of the Ham Playing Fields and Ham Street Car Park, and
- Grade II York House (NHLE 1001548) which is also located on the north bank of the River Thames within the Twickenham Riverside Conservation Area in the central part of the study area, approximately 160m to the northwest of the Ham Playing Fields and Ham Street Car Park

Regional and local designations summary

8.4.9 Ten Conservation Areas are located within the study area. The majority of the Conservation Areas are located within the central and southern parts of the study area along the river frontages and encompassing historic estates and settlements cores.

8.4.10 There are 11 APAs located within the study area including ten Tier II APAs and one Tier III APA[129]. The APAs are concentrated within the central and southern parts of the study area as shown on Plan 8.1 in Appendix A Plans.

Summary of receptors by key infrastructure site

Mogden STW

8.4.11 The Mogden STW site does not contain any designated heritage assets and is not located within either a Conservation Area or APA.

8.4.12 The nearest designated heritage assets are: the Grade II Mogden House Listed Building (NHLE 1240831) located approximately 80m to the east of the STW; the Grade II Worton Hall (NHLE 1261035) located approximately 50m to the north; and the Grade II Church of St Mary the Virgin (NHLE 1416210) located approximately 140m to the northwest.

8.4.13 The nearest Conservation Area is Isleworth Riverside which is located 175m to the northeast. The closest APA is the Tier II Kneller Hall and Whitton APA within the LBR located 190m to the south of the STW.

8.4.14 The proposed works within the Mogden STW site are considered sufficiently screened, and removed from the sensitive receptors, due to the surrounding embankment, vegetation and intervening development so as to be unlikely to cause significant impacts.

Ham Playing Fields and Ham Street Car Park

8.4.15 The Ham Playing Fields/Ham Street Car Park (intermediate shaft site) does not contain any designated heritage assets. However, it abuts the Grade II* Ham House (NHLE 1000282) RPG and the northern part of the site (Ham Street Car Park) falls within the Ham House Conservation Area. The access route to the site (Ham Street) also passes through a section of both the RPG and Conservation Area which extends across Ham Street and comprises a tree lined access route.

8.4.16 A cluster of nine Listed Buildings, including the Grade I Ham House (NHLE 1080832), form a related group within the Ham Estate to the east of the site and are all within 300m of the Project.

8.4.17 The site is also located within the LBR Tier II Ham Fields APA. This APA covers a large area of undeveloped open land along the Thames riverside to the west of Ham. Prehistoric, Roman and Saxon finds have been discovered within the APA. The topographic and geological character of the area provided a favourable location for human occupation and settlement. As such, the APA is identified to have a high potential to contain important multi-period archaeological remains, including Saxon and Medieval evidence relating to the early settlement of Ham.

8.4.18 The northeastern part of the site (Ham Street Car Park) is also partly located within the Tier II Ham House and Grounds APA which covers the Grade I country house with associated grounds that provide an *in-situ* snapshot of life during the Stuart period.

Burnell Avenue and land south of Northweald Lane

8.4.19 The Burnell Avenue and Northweald Lane sites (reception shaft, connection shaft, outfall and intake, TLT connection (Northweald Lane option)) do not contain any designated heritage assets but do partly extend into the RBK Riverside North Conservation Area and the LBR Broom Water Conservation Area. The LBR Teddington Lock Conservation Area also lies immediately to the west of the site and extends across Teddington Lock and both river banks.

8.4.20 A significant cluster of Listed Buildings are present within the Ham Common and Parkleys Estate Conservation Areas to the northeast of the site. However, it is noted that the majority of the site is screened from these assets due to intervening residential areas.

8.4.21 The site also spans two APAs including the LBR Ham fields APA in the west (described above) and the RBK Stevens Eyots and Kingston Thames Riverside APA. This APA covers the Thames riverside in the northern part of the RBK. This APA is known to preserve geoarchaeological and/or archaeological evidence of past human activity within the Thames, its banks and lands close to its course.

Tudor Drive

8.4.22 The Tudor Drive site (TLT connection shaft) does not contain any designated heritage assets and is not located within either a Conservation Area or APA.

8.4.23 A significant cluster of Listed Buildings is present within the Ham Common and Parkleys Estate Conservation Areas approximately 130m to the northeast of the site. However, it is noted that the majority of the site is screened from these assets due to intervening residential areas.

8.4.24 The nearest APA is the Tier II Ham APA located approximately 150m to the northwest which covers the historic settlement along Ham Street and includes Ham Street Manor House.

Next Steps

8.4.25 The baseline understanding of the potential cultural heritage resource within the study area of the Project will be further developed during the EIA process through detailed desk-based assessment supported by site inspections. Key data sources to be used will include:

- A detailed review of the Greater London Historic Environment Record (GLHER) for information on non-designated archaeological sites and

finds, non-designated built heritage assets and previous archaeological interventions
- Examination of key historic maps, aerial photographs and sources as held by, for example, National Archives, Historic England Archive (Swindon), London Metropolitan Archives, and (as available) Thames Water Archives relating to Mogden STW
- Targeted walkover survey of the sites and other areas potentially affected
- Review of any unpublished archaeological reports relating to works within or in the immediate environs of the Project, particularly within Mogden STW
- Examination of the results of geological data and the results of any project specific Ground Investigation works being carried out

8.5 Sensitive Receptors and Potential Environmental Effects

8.5.1 In terms of the historic environment, a direct impact is an impact that will occur to the physical fabric or land of an asset and its curtilage and will include any impact upon the setting of that asset. This includes the truncation or removal of archaeological remains.

8.5.2 An indirect impact is an impact that might arise as a consequence of the operation and maintenance or construction of associated infrastructure by, for example, affecting viability of land leading to changes in the management or land use of archaeological or historic landscape features[130].

8.5.3 A cumulative impact can arise from multiple effects of the same project on a single heritage asset (intra project cumulative effects) or different multiple effects of the project and other developments on the same asset or incremental effects arising from a number of actions (inter project cumulative effects). Intra project cumulative effects will be considered within the historic environment chapter within the ES while inter project cumulative effects will be covered within a specific cumulative effects chapter within the ES (see Chapter 19 Cumulative Effects for definition of intra project and inter project cumulative effects).

Construction Phase

8.5.4 The setting of designated heritage assets is likely to be affected by construction works associated with the Project. However, these effects are anticipated to be temporary, only affecting the asset settings during the construction phase of the Project. Details on the construction phase of the Project are provided in Chapter 2 The Project. A temporary effect (primarily upon the setting of off-site historic buildings) may also occur through the effect of increased Heavy Goods Vehicle (HGV) movements on historic buildings, historic landscape features or archaeological monuments.

8.5.5 There is the potential for known and currently unknown archaeological deposits to be disturbed or removed by construction activities associated with the Project including deposits of geoarchaeological and palaeoenvironmental interest. Intrusive groundworks may truncate or destroy any archaeological remains present within the footprint of temporary and permanent compounds, shaft sites, and in the location of any new infrastructure.

8.5.6 The proposed conveyance route for the recycled water associated with the Project will be tunnelled. As the tunnel will be located at a much greater depth than any surviving archaeological deposits (the tunnel would be bored at a depth of around 20-30m for the majority of the route) within the archaeologically sterile London Clay, it is highly unlikely that these routes would have any effect upon archaeological deposits present within the EIA Scoping Boundary. As such, construction of the tunnel is proposed to be scoped out in relation to archaeological remains.

8.5.7 Land stability issues, such as subsidence, which could result in effects to heritage assets on the surface resulting from tunnelling activities will be investigated as part of the ongoing ground investigation for the Project and assessed by the design team. The findings and conclusions on land stability from the subsequent Ground Investigation Report, and associated reports, will be summarised in the ES. However, it is anticipated that there will be no significant effects on heritage assets on the surface as a result of tunnelling activities and this will be scoped-out.

Operational Phase

8.5.8 It is possible that the operation of some new infrastructure (intake/outfall structures at Burnell Avenue) may affect the setting of nearby designated heritage assets or directly alter the special architectural and historical interest of a Conservation Area. It is anticipated that the extent and nature of any such effects would be fully investigated, and mitigation strategies identified as part of the EIA process.

8.5.9 It is unlikely that the operation of any element of the Project would have further effects upon non-designated archaeological remains following construction. It is unlikely that below-ground assets (tunnels/pipelines), once constructed, would have any effect upon the setting of nearby designated heritage asset receptors. As such, these matters are proposed to be scoped out.

8.6 Assessment Methodology

8.6.1 The approach to the EIA assessment for the historic environment will follow the methodology principles described in Chapter 5 EIA Methodology. The historic environment assessment, and supporting studies, will be carried out in line with the relevant standards and guidance. It will follow good practice methodologies as appropriate, including:

- Design Manual for Roads and Bridges (DMRB) LA 106 Cultural Heritage Assessment[131]
- Standards and Guidance for Historic Environment Desk-Based Assessment, Chartered Institute for Archaeologists (CIfA) (Updated 2020)[132]
- Statements of Heritage Significance: Analysing Significance in Heritage Assets, Historic England (2019)[133]
- The Setting of Heritage Assets, Historic England (Second Edition 2017);
- Managing Significance in Decision-Taking in the Historic Environment, Historic England (2015a)[134]
- Principles of Cultural Heritage Impact Assessment in the UK, Institute of Environmental Management and Assessment (IEMA), Institute of Historic Building Conservation and Chartered Institute for Archaeologists (July 2021)[135], and
- Geoarchaeology - Using Earth Sciences to understand the Archaeological Record, Historic England (2015b)[136]

8.6.2 The proposed criteria for assigning the sensitivity/value of the receptor (or asset 'significance' in heritage terms) are set out below in Table 8.2 and are aligned with the generic criteria presented in Chapter 5, Table 5.2. The criteria presented in Table 8.1 and Table 8.2 are based on the guidance provided by DMRB and the IEMA.

Table 8.2 Criteria used to determine importance of historical receptors

Sensitivity of receptor	Criteria
Very High	World Heritage Sites (including nominated sites). Assets of acknowledged international importance. Assets that can contribute significantly to acknowledged international research objectives
High	Scheduled monuments (including proposed sites). Undesignated assets of schedulable quality and importance. Assets that can contribute significantly to acknowledged national research objectives Grade I, Grade II* and Grade II listed buildings*. Conservation areas containing very important buildings. Undesignated structures of clear national importance

Sensitivity of receptor	Criteria
	Designated historic landscapes of outstanding interest (Grade I and II* RPG). Undesignated landscapes of outstanding interest. Undesignated landscapes of high quality and importance, and of demonstrable national value. Well preserved historic landscapes, exhibiting considerable coherence, time-depth or other critical aspect(s)
Medium	Non-designated assets that contribute to regional research objectives Historic (unlisted) buildings that can be shown to have exceptional qualities in their fabric or historical associations. Conservation areas containing buildings which contribute significantly to their historic character. Listed structures such as historic milestones which are not in their original location might warrant this value Designated special historic landscapes. Undesignated historic landscapes that would justify special historic landscape designation, landscapes of regional value. Averagely well-preserved historic landscapes with reasonable coherence, time-depth or other critical aspect(s)
Low	Non-designated assets of local importance. Assets compromised by poor preservation and/or poor survival of contextual associations. Assets of limited value, but with potential to contribute to local research objectives 'Locally listed' buildings. Historic (unlisted) buildings of modest quality in their fabric or historical association Robust undesignated historic landscapes. Historic landscapes with importance to local interest groups. Historic landscapes whose value is limited by poor preservation and/or poor survival of contextual associations
Negligible	Assets with very little or no surviving archaeological importance Buildings of no architectural or historical note; buildings of an intrusive character Landscapes with little or no significant historical interest

* Some Grade II Listed Buildings may be determined to be of Medium value following further assessment. This is aligned to the distinction made within the NPS (Paragraph 4.8.21) and NPPF between heritage assets of the highest significance (Grade I and II* Listed Buildings) and other designated heritage assets.

8.6.3 Specific criteria relating to impacts to heritage assets are described in Table 8.3.

Table 8.3 Criteria used to determine magnitude of change in relation to the historic environment

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

8.6.4 The importance and/or sensitivity of the receptor and the magnitude of change are combined to indicate the significance of predicted impacts. This would follow the generic chart presented in Figure 5.2, Chapter 5 EIA Methodology of this report. The identification of effects that are either significant or non-significant would follow the approach described in Chapter 5 EIA Methodology.

8.7 Mitigation

8.7.1 The need for, and the appropriate approach to, mitigation would vary according to the nature of the potential impact. Further baseline assessment work, and where necessary field evaluation, would be undertaken as part of the EIA to help to establish the full extent of the mitigation proposals, in consultation with Historic England and GLAAS, and other consultees as appropriate.

8.8 Summary of Scope for the EIA

8.8.1 Impacts to heritage assets as a result of changes to their settings in the vicinity of the Mogden STW are proposed to be scoped out due to the existing nature of the site and the screening provided by the surrounding embankment and vegetation.

8.8.2 Impacts to heritage assets from construction and operation of the tunnelled sections of the conveyance route are unlikely to give rise to significant effects and are therefore proposed to be scoped out. The tunnel is likely to be constructed within London Clay (generally at a depth of between 20-30m below ground level) which is of no geoarchaeological or palaeoenvironmental interest.

8.8.3 It is unlikely that the operation of any component of the Project would have further effects upon non-designated archaeological remains following construction, and therefore this is proposed to be scoped out.

8.8.4 A summary of receptors or impact pathways to be scoped in or out of the ES is provided in Table 8.4.

Table 8.4 Summary of the scope for historic environment

Local planning authority area	Location	Potential sensitive receptors	Potential impact	Potential effect Scoped In/Out
Construction				
LBH	Mogden STW site	Unknown non-designated heritage assets (archaeological remains)	Potential permanent disturbance or loss of known and unknown archaeological remains at new infrastructure site. Archaeological remains could be truncated or destroyed during groundworks within the shaft sites.	IN Detailed archaeological desk-based assessment to support the EIA.
		Designated heritage assets within the vicinity	Impact to heritage significance as a result of negative change to setting.	OUT Due to the nature of the site and existing surrounding embankments and vegetation significant effects on heritage assets as a result of changes to their settings are not predicted.
LBR		Ham House Grade II* Registered park and garden	Potential temporary negative impact upon asset as a result of	IN

Local planning authority area	Location	Potential sensitive receptors	Potential impact	Potential effect Scoped In/Out
	Ham Playing Fields/Ham Street Car Park	Ham House Conservation Area and associated Listed Buildings	changes to setting or development within a Conservation Area. The Ham Street Car Park partly extends into the Ham House Conservation Area.	Detailed setting assessment to support the EIA
		Twickenham Riverside Conservation Area		
		Ham Fields and Ham House and Grounds APAs	Potential permanent disturbance or loss of known and unknown archaeological remains at new infrastructure site. Archaeological remains could be truncated or destroyed during groundworks within the intermediate shaft site.	IN Detailed archaeological desk-based assessment to support the EIA
LBR and RBK	Burnell Avenue (reception shaft, connection shaft, outfall and intake) TLT connection shaft (Northweald Lane)	Riverside North Conservation Area	Potential temporary negative impact upon asset as a result of changes to setting or development within a Conservation Area.	IN Detailed setting assessment to support the EIA
		Teddington Lock Conservation Area	Potential temporary negative impact upon asset as a result of changes to setting or	IN Detailed setting assessment to support the EIA

Local planning authority area	Location	Potential sensitive receptors	Potential impact	Potential effect Scoped In/Out
			development within a Conservation Area.	
		Ham Common and Parkleys Estate Conservation Areas and associated Listed Buildings	Potential temporary negative impact upon asset as a result of changes to setting.	OUT Due to the distance and intervening buildings no significant effects are predicted on these assets.
		Ham Fields APAs	Potential permanent disturbance or loss of known and unknown archaeological remains at new infrastructure site.	IN Detailed archaeological desk-based assessment to support the EIA
		Stevens Eyots and Kingston Thames Riverside APA	Potential permanent disturbance or loss of known and unknown archaeological remains at new infrastructure site.	IN Detailed archaeological desk-based assessment to support the EIA
RBK	Tudor Drive site (TLT connection shaft)	Ham Common and Parkleys Estate Conservation Areas and associated Listed Buildings	Potential temporary negative impact upon asset as a result of changes to setting.	OUT Due to the distance and intervening buildings no

Local planning authority area	Location	Potential sensitive receptors	Potential impact	Potential effect Scoped In/Out
				significant effects are predicted on these assets.
		Unknown non-designated heritage assets (archaeological remains)	Potential permanent disturbance or loss of known and unknown archaeological remains at new infrastructure site.	IN Detailed archaeological desk-based assessment to support the EIA.
Operation				
LBH, LBR and RBK	All locations	Unknown non-designated heritage assets (archaeological remains)	N/A	OUT
LBH	Mogden STW site	Designated heritage assets within the vicinity	N/A	OUT
LBR	Ham Playing Fields/Ham Street Car Park	Ham House Grade II* Registered park and garden	Potential permanent negative impact upon Grade II* registered park and garden, Ham House as a result of changes to its setting.	OUT Given the scale of proposed infrastructure (small partially buried shaft hatch) in this location, a significant effect on these heritage assets is not predicted.
		Ham House Conservation Area and associated Listed Buildings	Potential permanent negative impact upon Ham House Conservation Area and associated Listed Buildings as a	

Local planning authority area	Location	Potential sensitive receptors	Potential impact	Potential effect Scoped In/Out
			result of development within the designated Conservation Area or as a result of changes to setting.	
		Twickenham Riverside Conservation Area	Potential permanent negative impact upon the setting of Twickenham Riverside Conservation Area as a result of development.	
		Ham Fields and Ham House and Grounds APAs	Potential permanent loss of known and unknown archaeological remains.	
LBR and RBK	Burnell Avenue (outfall and intake)	Riverside North Conservation Area	Potential permanent negative impact upon Riverside North Conservation Area as a result of changes to its setting or due to development within the Conservation Area.	IN Detailed setting assessment to support the EIA
		Teddington Lock Conservation Area	Potential permanent negative impact upon Teddington Lock Conservation Area as a result of	IN Detailed setting assessment to support the EIA

Local planning authority area	Location	Potential sensitive receptors	Potential impact	Potential effect Scoped In/Out
			changes to its setting or due to development within the Conservation Area.	
		Ham Common and Parkleys Estate Conservation Areas and associated Listed Buildings	Potential permanent negative impact upon Common and Parkleys Estate Conservation Areas and Listed Buildings therein as a result of changes to setting.	OUT Due to the distance and intervening buildings no significant effects are predicted on these assets.
RBK	Burnell Avenue (reception shaft, connection shaft, TLT connection (Northweald Lane))	Riverside North Conservation Area	Potential permanent negative impact upon Riverside North Conservation Area as a result of changes to its setting or due to development within the Conservation Area.	OUT Given the scale of proposed infrastructure (small partially buried shaft hatch) in this location, a significant effect on these heritage assets is not predicted.
		Teddington Lock Conservation Area	Potential permanent negative impact upon Teddington Lock Conservation Area as a result of changes to its setting or due to development within the Conservation Area.	OUT Given the scale of proposed infrastructure (small partially buried shaft hatch) in this location, a significant effect

Local planning authority area	Location	Potential sensitive receptors	Potential impact	Potential effect Scoped In/Out
				on these heritage assets is not predicted.
		Ham Common and Parkleys Estate Conservation Areas and associated Listed Buildings	Potential permanent negative impact upon Common and Parkleys Estate Conservation Areas and Listed Buildings therein as a result of changes to setting.	OUT Given the scale of proposed infrastructure (small partially buried shaft hatch) in this location, a significant effect on these heritage assets is not predicted.
RBK	Tudor Drive site (TLT connection shaft)	Ham Common and Parkleys Estate Conservation Areas and associated Listed Buildings	Potential permanent negative impact upon Common and Parkleys Estate Conservation Areas and Listed Buildings therein as a result of changes to setting.	OUT Due to the distance and intervening buildings no significant effects are predicted on these assets.

9 Terrestrial Ecology

9.1 Introduction

9.1.1 This chapter sets out the proposed scope of the Environmental Impact Assessment (EIA) in relation to terrestrial ecology and how the potential impacts of the Project will be assessed. This chapter should be read in conjunction with the description of the Project as presented in Chapter 2 The Project.

9.1.2 The key impacts to be considered are listed below:

- permanent and temporary habitat loss within the EIA Scoping Boundary
- direct mortality or harm to protected or ecologically significant species within the EIA Scoping Boundary
- deterioration or fragmentation of surrounding habitats, and
- anthropogenic disturbance of protected or ecologically significant species within surrounding habitats

9.2 Consultation and Engagement

9.2.1 Non-Statutory Public Consultation was undertaken from October 2023 to December 2023 to seek feedback about the site options for the Project from a variety of people such as landowners, residents, businesses, local authorities, and other statutory bodies who might be affected by or interested in the Project. In relation to terrestrial ecology, the responses referenced potential concerns about impacts on biodiversity, wildlife, and habitats, particularly within Ham Lands and Ham Lands Local Nature Reserve and along the lower River Thames. Engagement has been undertaken with Natural England throughout scheme development with the latest meeting held in May 2024. This latest meeting discussed updates to the Project design, as reflected in Chapter 2 The Project. The meeting also discussed the requirement to screen in stag beetle *Lucanus cervus* due to the presence of habitat within the EIA Scoping Boundary which is functionally linked to habitat within Richmond Park Special Area of Conservation (SAC) designated for the species.

9.2.2 On 25 July 2024, further engagement was carried out with representatives from London Borough of Hounslow (LBH), London Borough of Richmond upon Thames (LBR) and Royal Borough of Kingston Upon Thames (RBK) via video link. The Project team outlined the baseline environment in relation to terrestrial ecology and the proposed assessment methodology. The Project team also provided an outline of which matters within the terrestrial ecology aspect were proposed to be scoped in and which were proposed to be scoped out. During the meeting LBR made reference to a population of badgers living in the urban area to the north of the site with individuals

observed crossing the road into Ham Lands. It was suggested that the survey area buffer be increased to capture this additional area. Assurance was given that this would be looked in to and that potential fragmentation effects on badgers outside the survey area would be considered.

9.2.3 Engagement with the local planning authorities and Natural England will continue as assessment work is undertaken to prepare the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES). Engagement will also be undertaken with a wider set of consultees when appropriate, including the local wildlife trusts and conservation groups.

9.3 Legislation and Policy Review

9.3.1 Key policy relevant to terrestrial ecology set out in the National Policy Statement (NPS) for Water Resources Infrastructure[137] includes but is not limited to:

- Paragraph 4.3.5 requires the applicant to ensure that the ES outlines any likely significant effects on internationally, nationally and locally designated sites of ecological importance on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity
- Paragraph 4.3.6 requires the applicant to demonstrate how the Project has sought opportunities to conserve and enhance biodiversity
- Paragraph 4.3.7 requires the applicant to demonstrate the implementation of appropriate mitigation measures, to include identifying where and how these will be secured
- Paragraph 4.3.11 notes that (subject to specific policies), the development should avoid significant harm to biodiversity and geological conservation interests and provide net gains for biodiversity
- Paragraph 4.3.13 notes that the highest level of biodiversity protection is afforded to sites identified through international conventions and that habitats may be qualifying features of sites designated under the Conservation of Habitats and Species Regulations 2017 (as amended) ('the Habitats Regulations') and international conventions including Ramsar
- Paragraph 4.3.15 notes that where an adverse effect on a Site of Special Scientific Interest (SSSI) is likely, that a development consent should only be granted where the benefits of the development at this site clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest, and any broader impacts on the national network of SSSIs
- Paragraph 4.3.17 notes that due consideration should be given by the Secretary of State to regional or local designations to ensure that these sites are safeguarded, however, given the need for new infrastructure,

these designations should not be used in themselves to refuse development consent where harm cannot be avoided or adequately mitigated

- Paragraph 4.3.18 requires the developer to identify ways to avoid negative effects on ancient woodland or ancient and veteran trees
- Paragraph 4.3.19 requires that applicants take measures to ensure species and habitat that have been identified as being of principal importance for the conservation of biodiversity in England and Wales are protected from adverse effects
- Paragraph 4.3.21 requires the applicant to set out how opportunities for on-site delivery of biodiversity net gain have been considered and, where they are proposed, how they have been incorporated into the project design
- Paragraph 4.3.22 requires when delivering biodiversity net gain off-site, that developments do this in a manner that best contributes to the achievement of relevant wider strategic outcomes, for example by increasing habitat connectivity or enhancing other ecosystem service outcomes

9.3.2 In addition to the policy set out in the NPS for Water Resources Infrastructure, the Project will also have regard to other relevant legislation, policy, standards and guidance for this aspect, as listed in Table 9.1. A summary of the legislative, policy and guidance framework for this aspect, and how it accords with the Project, will be provided in the PEI Report and ES.

Table 9.1 Relevant legislation, policy and guidance

Relevant legislation, policy and guidance
Legislation
The Conservation of Habitats and Species Regulations 2017 (as amended)
The Conservation on Wetlands of International Importance (1971) (the Ramsar Convention)
The Wildlife and Countryside Act 1981 (as amended)
The Natural Environment and Rural Communities (NERC) Act 2006
The Countryside Rights of Way Act 2000
The Environment Act 2021
The Hedgerows Regulations 1997
The Protection of Badgers Act 1992

Relevant legislation, policy and guidance
National policy
NPS for Water Resources Infrastructure 2023[138]
The National Planning Policy Framework (NPPF) 2023[139]. It is noted that the NPPF (2024) was under consultation until September 2024
Regional and local policy
The London Plan 2021[140]
The LBH Local Plan 2015 - 2030[141] and the LBH Local Plan 2020 - 2041 (emerging policy)
The LBR Local Plan 2015 - 2018[142] and the LBR 'Pre-Publication' Draft Local Plan (2024)[143]
The RBK Core Strategy (2012)[144] and Kingston's Local Plan 2019 - 2041 (emerging policy)[145]
Guidance
Guidelines for Ecological Impact Assessment in the UK and Ireland, Terrestrial, Freshwater and Coastal[146]

9.3.3 Combined, the legislation and policies associated with terrestrial ecology aim to protect designated sites, protected species, and habitats from harm, as well as setting targets for proposed developments to improve the natural environment.

9.4 Existing Environment and Baseline Conditions

Study area

9.4.1 The study area has been informed by CIEEM guidelines[147] and the Zone of Influence (Zol), comprising the EIA Scoping Boundary and areas outside in which important ecological features (including habitats and species) have the potential to be affected by biophysical changes as a result of the Project.

9.4.2 The study area buffers from the EIA Scoping Boundary used for different ecological features, which vary depending on their sensitivity to environmental change, are detailed below in Table 9.2 and illustrated on Plans 9.1 and 9.2 in Appendix A Plans. These buffers were discussed in the meetings with the Local Planning Authorities (LPAs) and no comments were given and no changes were requested at the time. Desk based study records have been sought for the study areas identified.

Table 9.2 Study area buffers used for ecological features in the desk study

Feature	The study area
Internationally designated statutory sites with bats as a qualifying feature (SAC)	10km
Internationally and nationally designated statutory sites (SAC without bats as a qualifying feature, Special Protection Area (SPA), Ramsar, Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR))	2km
Locally designated statutory and non-statutory sites (Local Nature Reserves (LNR) and Sites of Importance for Nature Conservation (SINC))	2km
Priority habitat	200m
Ancient Woodland	200m
Ancient/veteran trees	100m
Protected and notable species	2km
Invasive non-native species (INNS)	2km
Waterbodies suitable for great crested newt (GCN) *Triturus cristatus*	500m

9.4.3 Preliminary Ecological Appraisals (PEA), comprising a desk study and field surveys (considering both habitats and species), were conducted for the Project at Regulators' Alliance for Progressing Infrastructure Development (RAPID) Gate 2 in 2022[148].

9.4.4 Updated PEAs will be completed to support the preparation of the PEI Report and ES. This will include the following areas where there are above-ground works:

- Mogden sewage treatment works (STW) (including the Western Work Area and the Eastern Work Area; drive shaft and interception shaft);
- Ham Playing Fields (intermediate shaft option 1)
- Ham Street Car Park (intermediate shaft option 2) (only one option for the intermediate shaft will be required, both are still under consideration)
- Burnell Avenue (reception shaft, outfall and intake)
- Northweald Lane (Thames Lee Tunnel (TLT) connection shaft), and
- Tudor Drive (TLT connection shaft)

9.4.5 The above areas are hereby referred to as 'above ground sites'. See Chapter 2 The Project for definition and Figure 2.2, Figure 2.3 and Figure 2.4 of above ground sites.

9.4.6 The above ground sites will be subject to PEA as opposed to the whole tunnelled conveyance route. This is because there are above ground works at these locations, and the above ground works are the only element of the Project with potential implications on terrestrial ecology.

Baseline sources

9.4.7 The collection of baseline information to date has focused on those features that are considered to be of 'importance' and where the Project could feasibly create an impact pathway from which the feature could experience a potential likely significant effect[149].

9.4.8 The baseline has been established by utilising the following sources of information:

- Greenspace Information for Greater London (GiGL)[150]
- Multi-Agency Geographic Information for the Countryside (MAGIC)[151]
- Publicly available Ordnance Survey maps and aerial imagery
- Statutory designated site information from the Joint Nature Conservation Committee (JNCC)
- National Inventory for Ancient Woodland[152]
- Woodland Trust Ancient Tree Inventory[153]
- Priority Habitats Inventory (England)[154], and
- Field data (from surveys)

Baseline conditions

Desk-based

Statutory and non-statutory designated sites

9.4.9 There are no SACs within 10km of the EIA Scoping Boundary for which bats are a qualifying feature.

9.4.10 The relevant statutory and non-statutory designated sites located within 2km of the EIA Scoping Boundary have been identified through the desk study. These designations are detailed in Table 9.3 below and in Plan 9.1 in Appendix A. It should be noted that designated sites with multiple designations have varying boundaries.

Table 9.3 Designated sites within the study area

Designated site name	Designation	Protection	Importance
Richmond Park	SAC, SSSI, SINC	Statutory	International
Syon Park	SSSI, SINC	Statutory	National
Bushy Park and Home Park	SSSI, SINC	Statutory	National
Ham Lands	LNR, SINC	Statutory	Local
Ham Common, Richmond, London	LNR	Statutory	Local
Isleworth Ait	LNR	Statutory	Local
River Thames and tidal tributaries	SINC	Non-statutory	Local
Crane Corridor	SINC	Non-statutory	Local
Tide Meadow at Syon Park	SINC	Non-statutory	Local
St Margarets Residential Grounds	SINC	Non-statutory	Local
Mogden Sewage Works	SINC, Site of Biodiversity Interest (SBI1)	Non-statutory	Local
Duke of Northumberland's River at Isleworth	SINC	Non-statutory	Local
Royal Mid-Surrey Golf Course	SINC	Non-statutory	Local
Duke of Northumberland's River north of Kneller Road	SINC	Non-statutory	Local
River Crane at St Margarets	SINC	Non-statutory	Local
Piccadilly Line Railsides in Hounslow	SINC	Non-statutory	Local
Hounslow Loop Railsides	SINC	Non-statutory	Local
Duke of Northumberland's River south of Kneller Road	SINC	Non-statutory	Local
Strawberry Hill Golf Course	SINC	Non-statutory	Local
Petersham Meadows	SINC	Non-statutory	Local
The Copse, Holly Hedge Field and Ham Avenues	SINC	Non-statutory	Local

Designated site name	Designation	Protection	Importance
Petersham Lodge Wood and Ham House Meadows	SINC	Non-statutory	Local
River Crane at St Margaret's (Richmond side)	SINC	Non-statutory	Local
Inwood Park	SINC	Non-statutory	Local
Royal Park Gate Open Space	SINC	Non-statutory	Local
Marble Hill Park and Orleans House Gardens	SINC	Non-statutory	Local
Terrace Field and Terrace Garden	SINC	Non-statutory	Local
Cassel Hospital	SINC	Non-statutory	Local
Twickenham Junction Rough	SINC	Non-statutory	Local
Ham Common west	SINC	Non-statutory	Local
Churchyard of St Mary with St Alban, Teddington	SINC	Non-statutory	Local
The Copse at Hampton Wick and Normansfield Hospital	SINC	Non-statutory	Local
Twickenham Road Meadow	SINC	Non-statutory	Local
Teddington Cemetery	SINC	Non-statutory	Local
Moor Mead Recreation Ground	SINC	Non-statutory	Local

Priority habitats

9.4.11 Priority habitats are present within the EIA Scoping Boundary and within the study area, these are shown on Plan 9.2 in Appendix A. Multiple areas of deciduous woodland priority habitat, traditional orchard priority habitat, and an area of lowland meadow priority habitat within 200m of the EIA Scoping Boundary were identified from MAGIC[155]. Deciduous woodland is present within Mogden STW and adjacent to the intake and outfall at Burnell Avenue and TLT connection above ground sites, and lowland meadow is located on the opposite side of the road to Ham Playing Fields site. A priority habitat river – the River Crane – was also identified within 200m of the EIA Scoping boundary[156]. The river intersects the EIA Scoping Boundary but is however over 800m from any of the above ground sites. Aside from the priority habitat identified via MAGIC, provides habitats identified during the UK Habitat Classification (UK Hab) survey.

Ancient woodland, ancient trees and veteran trees

9.4.12 A search of the Ancient Woodland inventory identified no Ancient Woodland within 200m of the EIA Scoping boundary. A search of the Ancient Tree inventory found no ancient trees within 100m of the EIA Scoping boundary. During field surveys undertaken to assess trees for their potential to support roosting bats and UK Habs surveys (within 30m of the EIA Scoping Boundary), trees were also assessed to determine if they meet the criteria for ancient/ veteran trees. Several veteran trees were identified within 100m of the EIA Scoping boundary; however, no veteran trees are located within 100m of above ground site boundaries.

Protected and notable species

9.4.13 Data from GiGL[157] provided recent (i.e., within the last ten years) records of protected, priority and notable species within 2km of the EIA Scoping boundary. These include:

- Amphibians: common toad *Bufo bufo,* common frog *Rana temporaria* and GCN
- Bats: serotine *Eptesicus serotinus*; Daubenton's *Myotis daubentoniid*; whiskered bat *Myotis mystacinus*; Natterer's bat *Myotis nattereri*; Leisler's *Nyctalus leisleri*; noctule *Nyctalus noctule*; lesser noctule *Nyctalus leisleri*; Nathusius' pipistrelle *Pipistrellus nathusii*; common pipistrelle *Pipistrellus pipistrellus*; soprano pipistrelle *Pipistrellus pygmaeus;* and, brown long-eared bat *Plecotus auratus*
- Birds: records for over 60 species of bird were returned. These include several Schedule 1 species including kingfisher *Alcedo atthis*; Cetti's warbler *Cettia cetti*; nightjar *Caprimulgus europaeus;* red kite *Milvus milvus;* peregrine falcon *Falco peregrinus;* and, barn owl *Tyto alba*
- Fungi and higher plants: protected and notable plant species including oak polypore *Piptoporus aquercinus*; cornflower *Centaurea cyanu*; large-leaved lime *Tilia platyphyllos*; and, clustered clover *Trifolium glomeratum*
- Invertebrates: over 70 species were returned including stag beetle; Roman snail *Helix Helix pomati;* white-letter hairstreak *Satyrium w-album;* and, brown hairstreak *Thecla betulae*
- Mammals (excluding bats): hazel dormouse *Muscardinus avellanarius*; European water vole *Arvicola amphibius*; European hedgehog *Erinaceus europaeus;* and, Eurasian badger *Meles meles*
- Reptiles: grass snake *Natrix Helvetica*; slow worm *Anguis fragilis*; common lizard *Zootoca vivipara;* and, adder *Vipera berus*

9.4.14 For the above ground sites, species-specific assessments will be performed for protected and notable species including, bats, birds, badgers, reptiles, invertebrates, and riparian mammals.

Invasive and non-native species

9.4.15 Data returned from GiGL[158] identified a number of recent records of non-native plant species within 2km of the EIA Scoping Boundary including butterfly-bush *Buddleja davidii,* Japanese knotweed *Reynoutria japonica,* and Himalayan balsam *Impatiens glandulifera*, as well as records of the invasive non-native mammal American mink *Neovison vison*.

Terrestrial ecology survey

9.4.16 In addition to the desk based records referenced above, the baseline environment will be informed through field surveys, further details of which are provided below.

9.4.17 The species-specific survey buffers that will be used in the field surveys from each above ground site are provided in Table 9.4. These are subject in part to any mitigation proposals/strategies to be developed with further engagement and agreement with stakeholders. These survey buffers for each species have been informed by their relative sensitivity and the legislation or planning policy that protects them.

*Table 9.4 Species specific survey buffers**

Species	Street survey buffer (from above ground site boundaries)
Badgers	Up to 30m
Bats	Up to 30m
Breeding birds	Within EIA Scoping Boundary
Reptiles	Within EIA Scoping Boundary
Schedule 1 birds	Up to 50m
GCN	N/A – likely absent (see 9.5.3)
Hazel dormouse	Up to 100m
Riparian mammals	Up to 200m up and downstream
Terrestrial invertebrates (including stag beetle *Lucanus cervus*)	Within EIA Scoping Boundary

**Source: Thames Water internal*

9.4.18 The survey buffers for species such as badgers and bats are for features with strict legal protection, such as setts in the case of badger and potential roosts in trees and buildings in the case of bats. For some protected species, such as dormice, the severance of habitat connectivity and the fragmentation of habitats is also illegal outside of the above buffers.

Therefore, appropriate consideration to habitat connectivity impacts will be given as part of the assessments.

9.4.19 As part of the RAPID Gate 2 PEA, a UK Hab survey was undertaken for the above ground sites outlined in paragraph 9.4.4. A summary of the habitats present at each above ground site, including any priority habitats identified, is provided in Table 9.5. Updates to PEA surveys, and further surveys for protected species will be undertaken to support the EIA. This will include assessing each habitat's condition in line with the Statutory Biodiversity Metric[159], in order to establish the Biodiversity Net Gain baseline.

9.4.20 It should be noted that the EIA Scoping Boundary, including above ground sites, will develop to become the Order Limits and the Limits of Deviation in the Development Consent Order application, the results provided in Table 9.5. Table 9.5 may alter in light of additional survey data proposed to be undertaken as part of the EIA. The additional surveys will also further inform the assessment of sensitive receptors and likely significant effects for the Project.

Table 9.5 UK Habitat Classification summary

Above ground site	Habitats present on site
Mogden STW (including Western Work Area and Eastern Work Area)	• Deciduous woodland (priority habitat) • Urban (e.g. STW infrastructure and access roads) • Modified and neutral grassland • Scrub • Individual trees
Ham Playing Fields	• Urban (e.g. roads) • Modified grassland • Individual trees
Ham Street Car Park	• Deciduous woodland (priority habitat) • Urban (e.g. car park, path, and road) • Modified grassland • Individual trees.
Burnell Avenue	• Other broadleaved woodland • Urban (e.g. path and roads) • Modified and neutral grassland • Individual trees • River Thames
Northweald Lane	• Other broadleaved woodland • Neutral grassland • Individual trees

Above ground site	Habitats present on site
Tudor Drive	• Urban (e.g. residential housing, paths, introduced shrub and roads) • Modified grassland and neutral grassland • Scrub • Individual trees

Future baseline

9.4.21 No significant change to the current baseline environment is envisaged with the above ground sites established in their current land use.

9.4.22 Any effect from climate change would be unlikely to significantly alter the land use and, therefore, the habitats prior to the construction of the Project. Long term impacts from climate change could alter the species composition and types of habitats in and around the EIA Scoping Boundary and, thus, the types and diversity of fauna. However, it is not anticipated that the combined impact of the Project and climate change would be any different to the impact of climate change in isolation (i.e. without the Project) as there are minimal impacts to terrestrial habitats and any habitat creation will be designed to be resilient to climate change.

9.5 Sensitive Receptors and Potential Environmental Effects

Sensitive receptors

9.5.1 An assessment of the potential sensitive receptors and associated impacts due to construction and operation of the Project have been undertaken to determine the scope of the terrestrial ecology chapter of the ES, as detailed below (Table 9.6) and summarised in Table 9.8. This assessment has considered the legislative protections, relevant policy and guidance, type of impacts and magnitude of impacts to either scope in or out for future consideration in the EIA process. Justification for scoping sensitive receptors out of the EIA is provided below.

Table 9.6 Scoping of potential effects to ecological features

Feature(s)	Description of potential effect	Scoped In/Out
Ancient woodland	N/A - no ancient woodland located within 200m of EIA Scoping Boundary.	OUT
Ancient/veteran trees	N/A - there are six veteran trees within 100m of the EIA Scoping Boundary. However, there are no ancient or veteran trees located within 100m of above ground site boundaries. Any potential effects would	OUT

Feature(s)	Description of potential effect	Scoped In/Out
	emanate from above ground sites and therefore ancient and veteran trees have been scoped out.	
Priority habitats	Habitat loss, fragmentation or modification and introduction and spread of INNS (resulting in habitat loss/modification). Potential exposure to pollution incidents, air and dust emissions.	IN
Notable vascular plants	Habitat loss, fragmentation or modification; hydrological changes to surface and groundwater. Introduction and spread of INNS (resulting in habitat loss and modification).	IN
European designated sites, SSSI and NNR	Loss of and fragmentation of habitat and direct mortality of qualifying feature with functionally linked habitat: stag beetle, Richmond Park SAC NNR SSSI.	IN
LNR	Hydrological changes to surface and groundwater (resulting in mortality/injury of species and/or habitat loss/modification); air quality changes from nitrogen deposition and dust deposition; and introduction and spread of INNS (resulting in habitat loss/modification).	IN
LWS/SINC	Habitat loss, fragmentation or modification; hydrological changes to surface and groundwater (resulting in mortality/injury of species and/or habitat loss/modification); air quality changes from nitrogen deposition and dust deposition; and introduction and spread of INNS (resulting in habitat loss/modification).	IN
Bats	Potential loss of roost sites in trees; loss of foraging and commuting habitat; and disturbance of roosts.	IN
Badger	Potential loss of setts; loss of foraging habitat; and disturbance.	IN
Birds	Potential loss of nesting habitat; and loss of foraging habitat.	IN

Feature(s)	Description of potential effect	Scoped In/Out
Common toad	Loss of foraging habitat; and direct mortality.	IN
European hedgehog	Loss of habitat and direct mortality.	IN
Great crested newt (GCN)	N/A – likely absent (see 9.5.3).	OUT
Hazel dormouse	Habitat fragmentation, disturbance.	IN
Otter	Potential severance of commuting routes.	IN
Invertebrates listed as Species of Principal Importance (e.g. stag beetle)	Loss of habitat and direct mortality.	IN
Reptiles	Potential loss of habitat; and direct mortality.	IN
Water vole	N/A – likely absent (see 9.5.4).	OUT

9.5.2 It should be noted that surveys are ongoing and should any of the species currently assessed as being likely absent be identified within the survey buffers of the above ground sites, they will be scoped in.

9.5.3 No waterbodies suitable for breeding GCN were found to be present within 500m of the EIA Scoping Boundary. Additionally, small-scale losses of terrestrial habitat, especially where they occur over 500m from a breeding pond, are considered unlikely to have significant effects on GCN. As such, the Project would have no significant effects on GCN, and they have therefore been proposed to be scoped out of further assessment.

9.5.4 The River Thames is located within the boundary of the Burnell Avenue site (reception shaft, intake and outfall). This reach of the River Thames is characterised as a wide slow flowing lowland river, with water level controlled by Teddington weir operated by the Environment Agency. There is limited in-channel vegetation making it unsuitable habitat to support water vole. As such, the Project would have no significant effects on water voles, and they have therefore been proposed to be scoped out of further assessment.

9.5.5 All of the potential effects to ecological features detailed in Table 9.6 are those from the construction phase. Operational effects are assessed as being not significant and are scoped out. The justification for this is provided in paragraphs 9.5.10 to 9.5.12.

Potential environmental effects

Construction activities

9.5.6 The construction activities associated with the Project are detailed in Chapter 2 The Project.

9.5.7 Construction activities associated with the tunnelled elements of the project are not considered as a pathway to effect biodiversity features due to the depth of the tunnel, which is likely to be at a depth of between 20m and 30m for the majority of the route. Works at these depths are considered unlikely to have a disturbance impact on biodiversity receptors. The construction activities associated with the above ground sites have the potential to result in the following temporary and permanent effects on habitats and species in the terrestrial environment:

- Temporary or permanent habitat loss and/or degradation
- Disturbance of individuals or groups of protected, priority and notable species via noise, light, vibration, and visual disturbance
- Direct injury or mortality of individual animals and plants
- Pollution incidents which could lead to habitat degradation and injury/mortality to species (e.g., air pollution, sediment mobilisation, dust, hydrocarbons), and
- Introduction and spread of INNS

Operational activities

9.5.8 The operation of the Project would include the following activities:

- Operation and maintenance of the tertiary treatment plant (TTP) at Mogden STW, including reduced operation of the TTP and maintenance flows of recycled water when not fully operational
- Discharge of recycled water into the River Thames
- Abstraction of water from the River Thames and transfer of water to the TLT
- Operation and maintenance of new infrastructure located along the conveyance route, at the outfall and intake locations

9.5.9 The majority of the potential impacts from the Project are associated with the construction phase. Potential pathways from the operation of the Project to sensitive receptors have been assessed as not significant. Further details of these and the rationale are provided in paragraphs 9.5.10 to 9.5.12 below.

9.5.10 Changes in flow regime could impact on the suitability of the River Thames for commuting otter. However, due to the infrequent and limited impacts to flow and the plasticity in the behaviour of otters, impacts due to flow change are considered not significant.

9.5.11 Maintenance of the infrastructure within Mogden STW Eastern Work Area would involve limited lighting and anthropogenic noise disturbance.

However, this maintenance will be infrequent and this area has existing high levels of disturbance, so limited and infrequent marginal changes are not considered significant.

9.5.12 Similarly, maintenance along the tunnelled conveyance route will also be infrequent, and on an as-required basis. This will also represent very limited increases in lighting and anthropogenic disturbance, which is not considered significant.

Summary

9.5.13 The construction of the Project would result in the permanent loss of limited deciduous woodland priority habitat within Mogden STW (in the Eastern Work Area).

9.5.14 Both temporary and permanent loss of habitats and associated anthropogenic disturbance during construction would potentially have an effect on the following protected species:

- Bats, badger, breeding birds, common toad, European hedgehog, dormouse, reptiles, invertebrates including stag beetle, and otter

9.5.15 Temporary construction effects from the Project have been identified at the following habitats and designated sites:

- Grassland, scrub, deciduous woodland priority habitat and individual trees within Mogden Sewage Works SINC
- River habitat within the Duke of Northumberland's River north of Kneller Road SINC
- Grassland, other broadleaved woodland, deciduous woodland priority habitat and individual trees within Ham Lands SINC and LNR
- River habitat within the River Thames and tidal tributaries SINC
- Grassland, other broadleaved woodland, deciduous woodland priority habitat and individual trees within Royal Park Gate Open Space SINC, and
- Lowland meadow priority habitat within Petersham Lodge Wood and Ham House Meadows

9.6 Assessment Methodology

Introduction

9.6.1 The ecological assessment would be undertaken with reference to recognised guidance given in the Institute of Environmental Management and Assessment (IEMA)[160] and Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines[161]. The assessment methodology itself is semi-quantitative, based on empirical data and professional judgement.

9.6.2 The aims and objectives of the assessment are to:

- Determine the value/importance of ecological features (or receptors) to be affected by the Project)
- Assess the significance of the impacts on both the ecology of the EIA Scoping Boundary and surrounding features and characterise the impacts (e.g. extent, magnitude, duration, reversibility, timing and frequency)
- Identify cumulative impacts
- Identify likely significant effects of impacts in the absence of any mitigation
- Identify mitigation measures to avoid, minimise and/or reduce the likely significant effects and identify additional enhancement measures, and
- Establish likely residual impacts after mitigation has been implemented

Determining the value/importance of ecological features

9.6.3 Ecological features would be attributed a value/importance according to the criteria set out in Table 9.7, which has been created following CIEEM guidelines. Consideration would also be given to distinguishing both biodiversity value and legal status.

Table 9.7 Criteria for determining the value/importance of ecological features

Value	Criteria
International and European	An internationally designated site or candidate site, i.e. a SPA, provisional SPA, SAC, candidate SAC, Ramsar site, or area which would meet the published selection criteria for designation. A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat that is essential to maintain the viability of a larger whole. Sites supporting populations of internationally or European important species.
National (England)	A nationally designated site, i.e. SSSI, NNR, or discrete area which would meet the published selection criteria for national designation (e.g. SSSI selection guidelines). A viable area of a priority habitat identified in the UK Biodiversity Action Plan (BAP), or smaller areas of such habitat essential to maintain wider viability. Viable populations of nationally important species that are of threatened or rare conservation status, including those identified as priority species in the UK BAP.
Regional (South East)	Sites that exceed the Metropolitan-level designation but fall short of SSSI selection criteria.

Value	Criteria
	Smaller areas of key habitat identified in the UK BAP that is essential to maintain wider viability. Viable populations of nationally scarce species identified in Regional or Metropolitan BAP and/or regularly occurring populations of a regionally important species.
Metropolitan/ County (Greater London)	Sites recognised by local authorities, e.g. Sites of Metropolitan Importance (SMI), SINC or considered to meet published ecological selection criteria for such designation. A viable area of key habitat identified in the London BAP. A LNR designated as one of the best for habitats and/or species assemblages in the Metropolitan area. Viable populations of regionally scarce species identified in Regional or Metropolitan BAP and/or regularly occurring populations of a species important at the metropolitan scale.
Borough/ District (LBH, LBR, RBK)	Sites recognised by local authorities, e.g. Sites of Borough Importance or considered to meet published ecological selection criteria for such designation. A viable area of habitat identified in the District BAP. A LNR designated as one of the best for habitats and/or species assemblages in the Borough area. Viable populations of species identified in the Metropolitan BAP and/or regularly occurring populations of species important at the Borough scale.
Local (e.g. within 1km of the EIA Scoping Boundary)	Areas of habitat or populations/assemblages of species that appreciably enrich the local habitat resource (e.g. ponds). Sites that retain other elements of semi-natural aquatic vegetation due to their size, quality or the wide distribution within the local area are not considered for the above classifications. Viable populations of species identified in the Borough BAP and/or regularly occurring populations of species important at the Local scale.
Within the EIA Scoping Boundary only	Sites that retain habitats and/or species of limited ecological importance due to their size, species composition or other factors.

9.6.4 The next step is to determine which ecological features are of sufficient importance to be included in the assessment, with CIEEM guidelines[162] recommending this approach to ensure attention is focussed on those receptors that are susceptible to impact. Therefore, the thresholds for inclusion within the Ecological Impact Assessment (EcIA) are defined as any sites, habitats and/or species that are considered to be of at least Local biodiversity value.

Characterising impacts and effects

9.6.5 Once importance has been assigned to the ecological features and those of sufficient importance for inclusion have been identified, an assessment of the impacts likely to affect the features will be undertaken. The identification of impacts refers to ecological structure and function, and the impacts are assessed in the context of the predicted baseline conditions during the lifetime of the development. An 'impact' is defined by CIEEM as actions resulting in changes to an ecological feature and an 'effect' is defined as the outcome to an ecological feature from an impact[163]. When describing ecological impacts and effects, reference will be made to the following characteristics as required:

- Positive or negative impact, according to whether the change is in accordance with nature conservation objectives and policy
- Magnitude – refers to the size, amount, intensity and volume of an impact, in quantitative terms where possible (e.g. the amount of habitat lost, percentage change to habitat area, percentage decline in a species population)
- Extent – the spatial or geographical area over which an impact/effect may occur
- Duration – the time period for which an impact is expected to last. Impacts and effects may be described as short, medium or long-term, and permanent or temporary impact. These periods are defined in Chapter 5
- Reversibility – a permanent impact is one from which recovery is not possible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation
- Timing and frequency – the number of times an activity occurs will influence the resulting effect. This should consider whether impacts are constantly ongoing, separated but recurrent or single events and whether they occur during critical seasons or life-stages of habitats or fauna

Determining ecologically significant impacts

9.6.6 The ecological significance of an impact is defined by CIEEM as 'an impact (positive or negative) on the 'integrity' of a defined site or ecosystem and/or on the conservation status of habitats and species within a given geographical area'. The value of the feature that will be significantly affected and type of impact will be used to inform the geographical scale at which the impact is significant. A definition of 'integrity' is provided in the Government Circular: Biodiversity and Geological Conservation[164]: *'The integrity of a site is the coherence of its ecological structure and function, across its whole area that enables it to sustain the habitat, complex of habitats and/or levels of populations of the species for which it was classified*'.

9.6.7 The significance of any identified impact would be determined through application of CIEEM guidance alongside professional judgement.

9.6.8 As part of the design and assessment process, measures to deliver ecological mitigation, enhancement and compensation would be reviewed, with reference to the Code of Construction Practice (CoCP). Where additional mitigation is recommended within the ES, an assessment of residual impacts would be undertaken.

Assessment of residual impacts

9.6.9 Residual impacts are defined as ecological impacts that remain with the implementation of mitigation measures. An assessment of residual impacts would be undertaken to determine the likely significance of the effect on ecological features.

Assessment of cumulative impacts and effects

9.6.10 Inter project cumulative effects result from other proposed developments within the study area which may have effects on terrestrial ecology additional to the Project. Future assessment will assess the effects of the Project in conjunction with other developments as set out in Chapter 19 Cumulative Effects.

9.6.11 Intra project effects arise from interaction between different impacts from the same project on the same receptor. For example, in relation to terrestrial ecology cumulative effects may arise from both construction dust and changes to run-off on an adjacent wildlife site or habitat. Effects on terrestrial ecology from the Project may also interact with other impacts to affect a non-ecological receptor, for example, effects associated with loss of habitat and construction noise may result in an area being less attractive to visit, thereby affecting landscape and recreation. Such cumulative effects will be assessed within the various technical chapters of the ES.

9.7 Mitigation

9.7.1 The need for, and the appropriate approach to, mitigation would vary according to the nature of the potential impact on terrestrial ecology. Further baseline assessment work will be undertaken as part of the EIA to help inform the likelihood of impacting protected species and habitats, and to establish the full extent of the mitigation proposals.

9.7.2 Potential mitigation measures to be considered further during the assessment include:

- Retaining ecological features where possible such as by siting of temporary compounds, laydown areas and access in areas of least ecological sensitivity (for example, hardstanding, modified grassland)
- Timing of vegetation clearance to mitigate potential impacts on protected or ecologically significant species
- The application of good practice measures (such as exclusion zones) to manage and minimise likely significant effects during construction stage to designated sites, priority habitats and protected, priority and notable species
- The control of dust generation due to activities such as soil stripping and construction traffic movements over unsealed surfaces
- The management of lighting of shaft compounds
- The management of environmental incidents and accidents, e.g. noise and emissions, through the adherence to good practice guidance

9.7.3 In addition to mitigation, enhancement opportunities will also be investigated through further assessment and design development of the Project.

Habitats Regulations Assessment

9.7.4 Stage 1 Screening has been undertaken for the Project as part of a Habitats Regulations Assessment (HRA) to determine any likely significant effects on SPAs or SAC. This is provided in Appendix E. Likely significant effects have been identified on Richmond Park SAC for stag beetle, which will be carried through to Stage 2 Appropriate Assessment.

Biodiversity Net Gain

9.7.5 The Project will meet a 10% Biodiversity Net Gain (BNG), in accordance with the requirements of the Environment Act 2021. The objective of the BNG will be to leave the natural environment in a measurably better state than prior to the Project, through habitat creation and/or enhancement.

9.8 Summary of Scope for the EIA

9.8.1 A summary of receptors or impact pathways to be scoped in or out of the ES is provided in Table 9.8.

Table 9.8 Summary of the scope for terrestrial ecology

Local planning authority	Above ground site	Potential sensitive receptors	Potential effects			
			Construction	Scoped In/Out	Operation	Scoped In/Out
LBH	Mogden STW Western Work Area (drive shaft)	Habitats Deciduous woodland priority habitat, scrub, grassland, Mogden Sewage Works SINC, Duke of Northumberland's River north of Kneller Road SINC, protected or notable plants.	Temporary habitat loss. Potential exposure to pollution incidents, air and dust emissions and INNS.	IN	No likely significant effects	OUT
		Species Bats, badger, common toad, reptiles, invertebrates including stag beetle, European hedgehog, and breeding birds.	Loss of supporting habitat and disturbance (noise, vibration and light).	IN	No likely significant effects	OUT
LBH	Mogden STW Eastern Work Area (recycled water interception shaft)	Habitats Deciduous woodland priority habitat, Mogden Sewage Works SINC, Duke of Northumberland's River north of Kneller Road SINC, spread of INNS, and protected or notable plants.	Permanent habitat loss. Potential exposure to pollution incidents, air and	IN	No likely significant effects	OUT Supporting ecological assessment to cover non-significant issues

Local planning authority	Above ground site	Potential sensitive receptors	Potential effects			
			Construction	Scoped In/Out	Operation	Scoped In/Out
			dust emissions and INNS.			
		Species Bats, badger, common toad, reptiles, invertebrates including stag beetle, European hedgehog, and breeding birds.	Loss of supporting habitat and disturbance (noise, vibration, and light).	IN	No likely significant effects	OUT Supporting ecological assessment to cover non-significant issues
LBR	Ham Playing Fields and Ham Street Car Park (intermediate shaft and construction laydown area)	Habitats Individual trees, deciduous woodland priority habitat, lowland meadow priority habitat, Ham Lands LNR, Ham Lands SINC and River Thames and tidal tributaries SINC, spread of INNS and protected and notable plants.	Temporary loss of hedgerow Proximity of works to Ham Lands LNR, Ham Lands SINC and River Thames and tidal tributaries SINC. Potential exposure to pollution incidents, air and	IN	No likely significant effects	OUT

Local planning authority	Above ground site	Potential sensitive receptors	Potential effects			
			Construction	Scoped In/Out	Operation	Scoped In/Out
			dust emissions and INNS.			
		Species Bats, badger, common toad, reptiles, hazel dormouse, European hedgehog, and breeding birds.	Temporary loss of supporting habitat and disturbance (noise, vibration, and light) if species found to be present through further surveys.	IN	No likely significant effects	OUT
LBR	Land south of Burnell Avenue (reception shaft, connection	Habitats Other neutral grassland, deciduous woodland priority habitat, individual trees, Royal Park Gate Open Space SINC, River	Temporary and permanent habitat loss. Potential exposure to	IN	No likely significant effects	OUT

Local planning authority	Above ground site	Potential sensitive receptors	Potential effects			
			Construction	Scoped In/Out	Operation	Scoped In/Out
	shaft, outfall structure and ancillary infrastructure)	Thames and tidal tributaries SINC, spread of INNS and protected and notable plants.	pollution incidents, air and dust emissions and INNS.			
		Species Bats, common toad, invertebrates including stag beetle, reptiles, hazel dormouse, badger, birds, otter, and European hedgehog.	Loss of supporting habitat and disturbance (noise, vibration, and light).	IN	No likely significant effects	OUT
RBK	Intake facility, raw water conveyance shaft, pipeline and ancillary infrastructure (Land south of Burnell Avenue)	Habitats Modified grassland and other neutral grassland, deciduous woodland priority habitat, scrub, individual trees, Royal Park Gate Open Space SINC, River Thames and tidal tributaries SINC, spread of INNS and protected and notable plants.	Temporary and permanent habitat loss. Potential exposure to pollution incidents, air and dust emissions and INNS.	IN	No likely significant effects	OUT
		Species Bats, common toad, invertebrates including stag beetle, reptiles, hazel	Loss of supporting habitat and disturbance	IN	No likely significant effects	OUT

Local planning authority	Above ground site	Potential sensitive receptors	Potential effects			
			Construction	Scoped In/Out	Operation	Scoped In/Out
		dormouse, badger, birds, otter and European hedgehog.	(noise, vibration, and light).			
RBK	TLT connection shaft (Northweald Lane)	Habitats Modified grassland, other neutral grassland, deciduous woodland priority habitat, scrub, individual trees (including trees with high ecological value and maturity), Royal Park Gate Open Space SINC, River Thames and tidal tributaries SINC, spread of INNS and protected and notable plants.	Temporary and permanent habitat loss. Potential exposure to pollution incidents, air and dust emissions and INNS.	IN	No likely significant effects	OUT
		Species Bats, common toad, invertebrates including stag beetle, reptiles, hazel dormouse, badger, birds, otter, and European hedgehog.	Loss of supporting habitat and disturbance (noise, vibration and light).	IN	No likely significant effects	OUT
RBK	TLT connection shaft (Tudor Drive)	Habitats Scrub, individual trees, modified grassland, spread of INNS and protected and notable plants.	Temporary habitat loss, however habitats present are for amenity purposes including non-native	OUT Supporting ecological assessment to cover non-significant issues	No likely significant effects	OUT

Local planning authority	Above ground site	Potential sensitive receptors	Potential effects			
			Construction	Scoped In/Out	Operation	Scoped In/Out
			ornamentals and are of low value to biodiversity.			
		Species Potential for breeding birds and foraging bats.	Temporary loss of supporting habitat, however nature and location of site is urban and the potential for protected species is low.	OUT Supporting ecological assessment to cover non-significant issues	No likely significant effects	OUT

10 Aquatic Ecology

10.1 Introduction

10.1.1 This chapter of the Environmental Impact Assessment (EIA) Scoping Report sets out the proposed scope of EIA in relation to aquatic ecology and should be read in conjunction with the description of the Project as presented in Chapter 2 The Project.

10.1.2 This chapter describes the baseline aquatic ecological features of the relevant study areas (defined at section 10.4 below) as they are understood at present and identifies the potential environmental effects of the Project on aquatic or hydrologically connected protected sites, and aquatic ecology that could arise from the construction and operation of the Project. The chapter sets out the proposed methodology for the assessment of any likely significant effects of the Project on aquatic ecology in accordance with relevant recognised guidance in the Institute of Environmental Management and Assessment (IEMA) *Guidelines for Baseline Ecological Assessment* (IEMA Guidelines)[165] and the Chartered Institute of Ecology and Environmental Management (CIEEM) *Guidelines for Ecological Impact Assessment in the UK and Ireland* (CIEEM Guidelines)[166]. The chapter also identifies potential mitigation measures to be considered further during the assessment to avoid or minimise harm to aquatic receptors.

10.1.3 The chapter draws on the findings of other chapters, in particular Chapter 13 Water Resources and Flood Risk. This chapter also references Chapter 9 Terrestrial Ecology and Appendix F Water Framework Directive (WFD) Screening where evaluation of potential impacts on WFD waterbodies is undertaken.

10.2 Consultation and Engagement

10.2.1 Non-Statutory Public Consultation was undertaken from October 2023 to December 2023 to seek feedback about the site options for the Project from variety of people such as landowners, residents, businesses, local authorities, and other statutory bodies who might be affected by or interested in the Project. In relation to aquatic ecology, the responses tended to be general, relaying concerns about potential impacts on fish and aquatic ecology species.

10.2.2 Regular engagement with the National Advisory Unit (NAU), a unit set up to oversee environmental appraisals of strategic water resource projects with representatives from the Environment Agency (EA) and Natural England, has been held since 2021. This engagement via technical working groups has included workshops and meetings, which have helped to define the study

areas, datasets for use, additional data to collect, suitable modelling platforms, potential impacts, assessment methodologies and mitigation.

10.2.3 On 25 July 2024, further engagement took place with representatives from London Borough of Hounslow (LBH), London Borough of Richmond upon Thames (LBR) and Royal Borough of Kingston Upon Thames (RBK) via video link. The Project team outlined the baseline environment, the proposed assessment methodology and an outline of which aspects would be scoped in and out in relation to aquatic ecology.

10.3 Legislation and Policy Review

10.3.1 Key policy relevant to aquatic ecology set out in the National Policy Statement (NPS) for Water Resources Infrastructure[167] includes:

- Paragraph 4.3.5 requires the applicant to clearly set out any likely significant effects on internationally, nationally and locally designated sites of ecological or geological conservation importance on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity
- Paragraph 4.3.6 requires the applicant to show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests
- Paragraph 4.3.7 states that the applicants should include appropriate mitigation measures as an integral part of their proposed development, including identifying where and how these will be secured
- Paragraph 4.3.11 notes that (subject to specific policies), the development should avoid significant harm to biodiversity and geological conservation interests and provide net gains for biodiversity
- Paragraph 4.3.13 notes that the highest level of biodiversity protection is afforded to sites identified through international conventions and that habitats may be qualifying features of sites designated under the Habitats Regulations and international conventions including Ramsar
- Paragraph 4.3.17 notes that due consideration should be given to regional or local designations to ensure that these sites are safeguarded, however, given the need for new infrastructure, these designations should not be used in themselves to refuse development consent where harm cannot be avoided or adequately mitigated
- Paragraph 4.3.19 requires that applicants take measures to ensure species and habitats that have been identified as being of principal importance for the conservation of biodiversity in England and Wales are protected from adverse effects of development
- Paragraph 4.3.21 states that the applications for development consent should set out how opportunities for on-site delivery of biodiversity net

gain (BNG) have been considered and, where they are proposed, how they have been incorporated into the project design

- Paragraph 4.3.22 requires that any off-site delivery of BNG should be set out within the application for development consent. It also states that, when delivering biodiversity net gain off-site, developments should do this in a manner that best contributes to the achievement of relevant wider strategic outcomes, for example by increasing habitat connectivity

10.3.2 In addition to the policy set out in the NPS for Water Resources Infrastructure, the Project will also have regard to other relevant legislation, policy and guidance for this aspect, as listed in Table 10.1. A detailed summary of the legislative, policy, and guidance framework for this aspect, and how it accords with the Project, will be provided in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES).

Table 10.1 Relevant legislation, policy and guidance

Relevant legislation, policy and guidance
European legislation
The EU Directive establishing a framework for Community action in the field of water policy (Water Framework Directive (WFD)) (2000/60/EC)
The EU Directive on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) (92/43/EEC)
National legislation
Environment Act 1995
Environment Act 2021
Environmental Protection Act 1990
Infrastructure Act 2015
Planning Act 2008
The Water Framework (Standards and Classification) Directions (England and Wales) 2015
Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019
Conservation of Habitats and Species Regulations 2017
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
The Wildlife and Countryside Act (as amended) 1981

Relevant legislation, policy and guidance
The Natural Environment and Rural Communities (NERC) Act 2006
The Eels (England and Wales) Regulations 2009
Salmon and Freshwater Fisheries Act (as amended) 1975
The Invasive Alien Species (Enforcement and Permitting) Order 2019 (SI 527/2019)
The Thames Conservancy Act 1932
The Marine and Coastal Access Act 2009
The Port of London Act 1968 (as amended)
National policy and guidance
A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)
National Planning Policy Guidance 2023
NPS for Water Resources Infrastructure 2023[168]
The National Planning Policy Framework (NPPF) 2023 (Paragraphs 180-188)[169]. It is noted that the NPPF (2024) was under consultation until September 2024
IEMA Guidelines for Baseline Ecological Assessment (1995)
CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland (2018)[166]
Regional and local policy
The UK Biodiversity Action Plan (HM Government, 1994)
The London Plan 2021[170]
River Basin Management Plans (Environment Agency, 2022 (updated 2024))
The LBH Local Plan 2015 - 2030[171] and the LBH Local Plan 2020 - 2041 (emerging policy)
The LBR Local Plan 2015 - 2018[172] and the LBR 'Pre-Publication' Draft Local Plan (2024)[173]
The RBK Core Strategy 2012[174] and Kingston's Local Plan 2019 - 2041 (emerging policy)[175]

10.3.3 Combined, the legislation and policies associated with aquatic ecology aim to protect designated sites, protected species, and habitats from harm, as well as setting targets for proposed developments to improve the natural environment.

10.3.4 As part of the implementation of the European Union Water Framework Directive (2000/60/EC) each Member State within the European Union characterised surface waterbody types an identify the geographical location of each water along with the associated Water Framework Directive (WFD) typology of each waterbody identified. Such waterbodies include rivers, lakes and transitional waters and as part of WFD classification monitoring data from biological quality elements such as phytoplankton, phytobenthos, macrophytes, macro-algae, macroinvertebrates and fish is used in order to establish the WFD status of a waterbody. Appendix A Plan 13.1 identifies the WFD bodies in the vicinity of the EIA Scoping Boundary.

10.4 Existing Environment and Baseline Conditions

Study Areas

10.4.1 Two (overlapping) study areas have been identified and form part of the assessment of aquatic ecology, namely the EIA Scoping Boundary study area and the River Thames study area. These study areas have been informed by the Zone of Influence (ZoI) comprising the EIA Scoping Boundary and areas outside in which important ecological features (including habitats and species) have the potential to be affected by biophysical changes as a result of the Project [166].

10.4.2 The first, the EIA Scoping Boundary Study Area (see: Plan 10.1 in Appendix A Plans), includes:

- Water features within and within a 2km area of, the EIA Scoping Boundary which are hydraulically linked to Project sites. These include:
  - Duke of Northumberland's River
  - Freshwater and tidal River Thames
- Water features within 100m of, the EIA Scoping Boundary which are not hydraulically linked to Project sites. These include River Crane and Whitton Brook
- Water features within 250m of the EIA Scoping Boundary which are sensitive to disturbance

10.4.3 Within these water features the relevant aquatic ecology receptors for the purpose of the EIA have been identified. The study areas for each specific aquatic ecological receptor within the EIA Scoping Boundary study area comprises the land within the EIA Scoping Boundary and a buffer area outside of that boundary according to the sensitivity of the receptor. The same study areas will be used for the PEI Report and ES. The relevant aquatic ecological receptors and corresponding buffer areas are detailed in Table 10.2.

Table 10.2 Buffer area for aquatic ecological receptors

Receptors	Buffer area	Link to section in this report
Phytoplankton	Within 2km of the EIA Scoping Boundary where hydrological connectivity exists (also considered under wider River Thames Study Area)	Table 10.3 Summary of aquatic ecology baseline data. Phytoplankton
Phytobenthos (diatoms)		Table 10.3 Summary of aquatic ecology baseline data. Phytobenthos Aquatic macrophytes and macro-algae Aquatic macroinvertebrates (freshwater and estuarine)
Aquatic macrophytes and macroalgae		Table 10.3 Summary of aquatic ecology baseline data. Aquatic macrophytes and macro-algae Aquatic macroinvertebrates (freshwater and estuarine)
Aquatic macroinvertebrates, freshwater and estuarine		Table 10.3 Summary of aquatic ecology baseline data. Aquatic macroinvertebrates (freshwater and estuarine)
Fish (including freshwater and estuarine and migratory fish)		Table 10.3 Summary of aquatic ecology baseline data. (WFD/NERC) freshwater and estuarine (including European Eel) migratory fish (including European eel) Fish
Statutory sites and non-statutory designated sites	Within 2km of EIA Scoping Boundary where hydrological connectivity exists	Table 10.4 Statutory and non-statutory designated sites
Protected and notable species	White-clawed crayfish *Austropotamobius pallipes* - Within 250m of the EIA Scoping Boundary, or 2km of the EIA Scoping Boundary where hydrological connectivity exists	Table 10.5 Aquatic protected and notable species from within 2km of the EIA Scoping Boundary See also Terrestrial Ecology chapter (see Chapter 9) for seasonal protected species

Receptors	Buffer area	Link to section in this report
	Noise and vibration-sensitive species Within 2km of the EIA Scoping Boundary	
INNS	Within 2km of the EIA Scoping Boundary where hydrological connectivity exists (also considered under wider River Thames Study Area)	Table 10.3 Summary of aquatic ecology baseline data.
Habitats and priority habitats	Within 100m of project above ground sites, or 2km of the EIA Scoping Boundary where hydrological connectivity exists	Table 10.4 Habitats and priority habitats

10.4.4 This chapter does not consider all potential effects on protected species seasonally inhabiting ponds such as the great crested newt *Triturus cristatus* or species inhabiting rivers such as otter *Lutra lutra* and water vole *Arvicola amphibius*. These species are considered within the Terrestrial Ecology chapter (see Chapter 9).

10.4.5 The second study area "River Thames study area" includes:

- The reach 2km upstream of the Project intake/outfall being River Thames from Egham to Teddington (Egham to Teddington WFD waterbody) within the 2km buffer area, referred to in this chapter as "freshwater River Thames in the study area", and
- The reach downstream of the Project intake/outfall to Teddington Weir being River Thames downstream of the Teddington Weir tidal limit to Battersea, known as the Thames Tideway (Thames Upper WFD waterbody), and referred to in this Chapter as "tidal River Thames in the study area"

10.4.6 The River Thames study area is illustrated in Plan 10.1 in Appendix A Plans, showing the freshwater and tidal River Thames in the study area and how these overlap with the EIA Scoping Boundary study area.

10.4.7 The assessments to date, in modelling work for both aquatic ecology and water resources, have considered the tidal River Thames in the study area to Battersea Bridge downriver from Teddington Weir. Further modelling will be undertaken as part of the ES assessment in consultation with the NAU, the study area may be extended for the purposes of assessing the operational impacts of the Project, consistent with the approach to be undertaken as

part of the water resources and water quality assessment (see Chapter 13 Water Resources and Flood Risk).

10.4.8 The water abstracted from the River Thames at the intake will be transferred to Lockwood Pumping Station, part of Thames Water's Lee Valley reservoirs in North London via the existing Thames Lee Tunnel (TLT). This has been scoped out within Chapter 13 Water Resources and Flood Risk as there is a low risk of potential significant effects on water quality in these reservoirs. Chapter 13 indicates that the water quality at Teddington is very similar to that of the current TLT abstraction location (near Hampton on the River Thames). When operational, the Project abstraction would form only a portion of the water in the TLT. Waters from the two sources (Teddington and near Hampton on the River Thames) would be mixed within the TLT and with water already in Lockwood Pumping Station which could result in very small changes to water quality. Therefore, with low risk of significant change to water quality there are no identified pathways to effect identified for aquatic ecology receptors from the Project, Lockwood Pumping Station is not included in the study area for aquatic ecology.

Existing Environment and Baseline Conditions

10.4.9 The existing baseline has been established through a desk-based review of available data as well as targeted surveys completed as part of a monitoring programme. The monitoring programme was initially developed in 2020 and was subsequently amended to include additional features as the understanding of the design and operation of the Project has developed. This monitoring programme applies good practice guidance to collect additional data and was subject to consultation with the relevant regulators. This long-term monitoring programme includes the freshwater and tidal River Thames study area.

10.4.10 The relevant reaches for the Project are illustrated Plan 10.2 in Appendix A, and include the freshwater and tidal River Thames reaches in the study area, the latter extending downstream from the Project outfall location to the Thames Tideway at Battersea Park. As part of the Regulators' Alliance for Progressing Infrastructure Development (RAPID) gated process, evidence reports were produced for aquatic ecology[176], fish[177] and invasive non-native species (INNS)[178] at Gate 2, detailing monitoring locations and dates of surveys from 2020 to 2022. The surveys and baseline data will continue to be updated to support the ES.

10.4.11 The evidence base for aquatic ecology includes freshwater and estuarine fish species, weir pool and marginal habitat assessment and migratory fish species. Baseline data surveys for aquatic ecology have been conducted for aquatic macroinvertebrates (freshwater and estuarine), marginal habitat

assessment, plants/diatoms, and macroalgae, angiosperm and phytoplankton.

10.4.12 Table 10.3 provides a summary of the baseline data collected and used in the assessment work to date.

Table 10.3 Summary of aquatic ecology baseline data.

Receptor	Feature(s)	Baseline data
Phytoplankton	River Thames (Habitats – ponds, ditches, lakes and rivers)	Review of data from EA Ecology and Fish Data Explorer from 2011 to 2023 Gate 2 Aquatic Ecology Evidence Report [176]
Phytobenthos (diatoms)	River Thames (Habitats – ponds, ditches, lakes and rivers)	Review of data from EA Ecology and Fish Data Explorer from 2011 to 2023. Gate 2 Aquatic Ecology Evidence Report [176]
Aquatic macrophytes and macroalgae	River Thames (Habitats – ponds, ditches, lakes and rivers)	Review of data from EA Ecology and Fish Data Explorer from 2011 to 2023. Biological records data. Review of angiosperm data from EA BIOSYS database (2008 to 2019). Gate 2 Aquatic Ecology Evidence Report [176]
Aquatic macroinvertebrates, freshwater and estuarine	River Thames (Habitats – ponds, ditches, lakes and rivers)	Review of data from EA Ecology and Fish Data Explorer from 2011 to 2023. Gate 2 Aquatic Ecology Evidence Report [176]
Fish (WFD/NERC) freshwater and estuarine (including European eel)	River Thames (Habitats – ponds, ditches, lakes and rivers)	EA Ecology and Fish Data Explorer data from 2011 to 2023 throughout the study area (both river and estuary). Assessment of EA fisheries survey data including boom boat, hydroacoustic and Atlantic salmon and sea trout records post 2013. EA River Thames fish and eel trap data. Gate 2 Fisheries Evidence Report[177].

Receptor	Feature(s)	Baseline data
Migratory fish (including European eel)	River Thames (Habitats – ponds, ditches, lakes and rivers)	EA Ecology and Fish Data Explorer data from 2011 to 2023. Study area water quality data informing olfactory cues of diadromous fish and salmonid migratory cues. Assessment of WFD and Environmental Quality Standards Directive chemical quality throughout the study area (both river and estuary) for the range of reference conditions. Gate 2 Fisheries Evidence Report[177].
Statutory and non-statutory designated sites	Internationally and nationally designated statutory sites (Special Area of Conservation (SAC)), Special Protection Area (SPA), Ramsar, Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR)) Locally designated statutory and non-statutory sites (Local Nature Reserves (LNR) and Sites of Importance for Nature Conservation (SINC))	Table 10.4 under statutory and non-statutory designated sites
Protected and notable species	River Thames (Habitats – ponds, ditches, lakes and rivers)	EA Ecology and Fish Data Explorer data. Thames Tideway Tunnel data. Mammals - Review of Greenspace Information for Greater London (GiGL) data and Zoological Society of London reports in relation to bottle-nosed dolphin, common porpoise, common seal and grey seal distribution within the Thames Tideway. Gate 2 Fisheries Evidence Report[177].

Receptor	Feature(s)	Baseline data
		Gate 2 Aquatic Ecology Evidence Report [176].
INNS	River Thames (Habitats – ponds, ditches, lakes and rivers)	NBN data search within Study areas Gate 2 Aquatic INNS Evidence Report[178].
Habitats (ponds, ditches, lakes and rivers) and priority habitats (mudflats)	River Thames Duke of Northumberland's River (Habitats – ponds, ditches, lakes and rivers) Weir pool/Marginal habitat assessment Priority habitats - mudflats	EA Ecology and Fish Data Explorer data from 2011 to 2023. UK Habitat Classification (UKHab) and Modular River Physical Habitat (MoRPH) surveys within eight reaches within the Thames and in proximity to Burnell Avenue site. Gate 2 Aquatic INNS Evidence Report[178]. Priority Habitats Inventory (England)[179].

10.4.13 The RAPID Gate 2 assessments included a detailed review of the available data for the aquatic receptors associated with the Project. This identified the key datasets to consider, established the sensitivity of the aquatic receptors and identified where further field surveys were required (resulting in amendments to the Project monitoring programme) and was used to inform this baseline. Where applicable, the key data sources were updated to consider the most recent data sets for this EIA Scoping Report and are listed below:

- The magic.defra.gov.uk website to identify any statutory and non-statutory designated sites and priority habitats[180]
- Ordnance survey (OS) mapping, the EA Statutory Main Rivers Map and aerial imagery were reviewed to identify watercourses and standing waterbodies for the assessment of aquatic habitats and species (macroinvertebrates, macrophytes and fish)[181]
- The EA's salmonid main rivers map[182]
- EA Ecology and Fish Data Explorer (EA, 2024)[183] (capturing data from 2011 to 2023)
- EA supplementary requests including fish pass, elver pass and hydroacoustic data[184]
- A recent peer-reviewed paper on fish populations in the River Thames[185]
- EA WFD Ecological status for the 2015, 2019 and 2022 cycles[186]
- 2020 to 2022 Strategic Resource Option (SRO) Monitoring Programme data; including fish, fish habitat, invertebrates, macrophytes, diatoms, plankton/algae, specialist depressed river mussel (*Pseudanodonta complanata*) surveys in the River Thames; and multi-purpose eDNA

monitoring and bespoke INNS surveys within the EIA Scoping Boundary[187]

- GiGL biological records data, including species records and non-statutory designated site extents[188]
- Supplementary data from Thames Water Asset Management Plan cycle 4 (AMP4)[189]

10.4.14 Based on the understanding of the ecology and ecological process identified through review of these data, key aquatic receptors associated with the Project are the phytoplankton, phytobenthos (diatom), macrophyte and macroalgae, macroinvertebrate, fish, protected and notable species and INNS. Several designated and non-designated sites and priority habitats have also been identified within the EIA Scoping Boundary study area and/or River Thames study area. A description of the baseline for each key receptor is presented below.

Phytoplankton

10.4.15 Phytoplankton although not generally monitored for WFD river classification, are part of the WFD classification for coastal and transitional waters (see more information in Appendix F Water Framework Directive Screening) and are an important component of the freshwater and tidal River Thames aquatic ecosystems in the study area due in part to the large size of the river and the influence of water level control structures (for navigational purposes) on flows and level. This results in a deeper, slower flowing environment favouring phytoplankton communities. These communities, along with detritus (and to a lesser extent macrophytes), are the predominant food sources for the aquatic communities associated with the freshwater and tidal River Thames in the study area. The WFD waterbodies are as shown in Plan 13.1 in Appendix A Plans.

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

10.4.17 Phytoplankton is not routinely monitored by the EA for WFD purposes in freshwater waterbodies and no project specific data is available for the freshwater reaches of the River Thames. The phytoplankton element for the tidal River Thames within the study area (Thames Upper (Tideway) waterbody) was of 'Good' status in 2022 and also in 2019.

Phytobenthos (diatoms)

10.4.18 Phytobenthos (diatoms) are considered good indicators of water quality conditions, notably indicating where high phosphate is a potential cause of water quality impacts.

10.4.19 Across sites within the River Thames study area the available data suggest that the phytobenthos communities are indicative of assemblages that prefer nutrient enriched waterbodies.

10.4.20 The freshwater River Thames in the study area was of WFD 'Poor' status in both 2019 and 2022, leading to a combined classification of 'Poor' status for macrophytes and phytobenthos combined in both years.

Aquatic macrophytes and macro-algae

10.4.21 The data suggests macrophyte communities within the lower River Thames reaches are typical of large, base rich, lowland rivers and are indicative of communities which prefer nutrient enriched conditions. The freshwater River Thames in the study area was of WFD 'High' status for the macrophyte sub element in both 2019 and 2022. However, it should be noted that when combined with the phytobenthos sub element that the overall biological status of the combined macrophytes and phytobenthos quality element is WFD 'Poor' status. The WFD waterbodies are as shown in Plan 13.1 in Appendix A Plans.

10.4.22 The macroalgae element for the tidal River Thames in the study area was not publicly available in 2019 and 2022.

Aquatic macroinvertebrates (freshwater and estuarine)

10.4.23 Macroinvertebrate communities play an important role in the food chain within rivers, both as food for other groups such as fish and birds but also playing essential roles in ecological processes including filtering, and the shredding and processing of organic material such as dead leaves and plant matter. The macroinvertebrate community of the freshwater and tidal River Thames in the study area includes a relatively high number of INNS, however it also includes representatives of groups sensitive to organic pollution such as caddisfly (Leptoceridae and Molannidae). Mussels also form an important part of the community with a number of species present and the rare, depressed river mussel *Pseudanodonta complanate* recorded locally.

10.4.24 The available data indicates that macroinvertebrate communities of the freshwater River Thames and tidal River Thames in the study area range from 'Poor to 'Good' status. The WFD waterbodies are as shown in Plan 13.1 in Appendix A Plans.

10.4.25 The invertebrate element for the freshwater River Thames in the study area was of WFD 'Poor' status in 2019 and 'High' status in 2022. The invertebrate element for the tidal River Thames in the study area was not publicly reported in 2019 and 2022.

Fish (freshwater and estuarine and migratory fish)

10.4.26 The freshwater River Thames fish community in the study area is diverse and representative of the dominant habitat, which is slow-flowing glide, typical of a lowland river. The EA and project-specific fisheries monitoring data has identified 32 species of fish present within this reach, though seven coarse fish species along with European eel *Anguilla anguilla* dominate the fish community and contribute up to ~93% of the reported total abundance, which are: roach *Rutilus rutilus,* dace *Leuciscus leuciscus,* gudgeon *Gobio gobio, pike Esox lucius,* perch *Perca fluviatilis,* bleak *Alburnus alburnus* and chub *Squalius cephalus.*

10.4.27 The freshwater River Thames in the study area is not currently classified by the EA for the fish biological quality element.

10.4.28 The tidal River Thames fisheries data for the study area is representative of oligohaline water quality. The fish community present is dominated by freshwater species along with estuarine fish species that can tolerate low salinity or freshwater environments. EA data has identified 26 species within this reach though two coarse fish species and three estuarine species contribute approximately ~90% of the reported total abundance, which are: dace, flounder *Platichthys flesus,* roach, common goby *Pomatoschistus microps* and sea bass *Dicentrarchus labrax*.

10.4.29 The tidal River Thames in the study area was classified by the EA in 2019 and 2022 as achieving WFD 'Good' status for fish.

Statutory and non-statutory designated sites

10.4.30 As detailed in Chapter 9 Terrestrial Ecology, preliminary ecological appraisal and UKHab were completed at a number of sites within the EIA Scoping Boundary. Only those sites with potential hydrological connectivity and aquatic or estuarine receptors have been considered. A summary of the relevant receptors requiring further consideration is provided in Table 10.4 and can be seen in Plan 10.1 in Appendix A Plans.

10.4.31 While areas of the EIA Scoping Boundary study area fall within the River Crane waterbody and in proximity to the Whitton Brook, no construction works are planned which would be in hydraulic connectivity to the river body features.

Table 10.4 Statutory and non-statutory sites and habitats with water dependant features within the relevant study area (see Table 10.2)

Site	Proximity	Designation criteria	Receptor for consideration
National Statutory Designated Conservation Sites			
Syon Park	Approximately 7.3km downstream of proposed outfall location and within 2km of Mogden STW.	SSSI	Unit 004 fen, marsh and swamp – Lowland (favourable condition). The site represents one of the largest single remaining areas of floodplain swamp in the Greater London area and supports wetland invertebrate fauna, including several rare species.
Local Statutory and non-statutory Designated Nature Conservation Sites			
River Thames and Tidal Tributaries (freshwater and tidal River Thames in the study areas)	Intake and outfall structures located within EIA Scoping Boundary. Proximity to intermediate shaft.	SINC (non-statutory)	All aquatic ecology receptors as identified in Table 10.2 and Table 10.3.
Ham Lands	Intermediate shaft location within EIA Scoping Boundary and approximately 0.6km downstream of outfall.	LNR (statutory)	Wetland features. Note that this will be considered further as part of the terrestrial ecology assessment and will not therefore be included in the aquatic ecology chapter.
Isleworth Ait	Within 2km of the existing Mogden STW discharge location.	LNR (statutory)	German hairy snail *Perforatella rubiginosa* and its marginal habitat.
Priority habitats			
Mudflats	Within 2km of existing Mogden STW discharge and Duke of	Priority habitat	Mudflats identified within 2km of the EIA Scoping Boundary.

Site	Proximity	Designation criteria	Receptor for consideration
	Northumberland's River.		
Watercourses			
Duke of Northumberland's River	Adjacent to/within Mogden STW site.	Surface waterbody	Channel 100m upstream of Mogden STW, through Mogden STW to downstream extent.
River Thames (freshwater River Thames in the study areas)	Outfall and intake location.	Surface waterbody	All aquatic ecology receptors as identified in Table 10.2 and Table 10.3.
Thames Upper (tidal River Thames in the study areas)	Receives the existing Mogden STW discharge location.	Surface waterbody	All aquatic ecology receptors as identified in Table 10.2 and Table 10.3.

Protected and notable species

10.4.32 The data from GiGL records from within 2km[190] of the EIA Scoping Boundary showed a total of 41 aquatic protected species. The full list of these 41 protected aquatic species is shown in Table 10.5 and shows a number protected and notable species, including but not limited to; European eel *Angullia anguilla*, scarce emerald damselfly *Lestes dryas*, water-violet *Hottonia palustris*, fringed water-lily *Nymphoides peltata*, water mint *Mentha aquatica*, large-mouthed valve snail *Valvata macrostoma* and the amphipod *Apocorophium lacustre*.

Table 10.5 Aquatic protected and notable species from within 2km of the EIA Scoping Boundary

Group	Species
Mammals	Bottle-nosed dolphin *Tursiops truncatus* Common porpoise *Phocoena phocoena* Common seal *Phoca vitulina* Grey seal *Halichoerus grypus*
Fish	Atlantic salmon *Salmo salar* Barbel *Barbus barbus* European eel *Anguilla anguilla*

Group	Species
	European smelt *Osmerus eperlanus*
Aquatic macroinvertebrates	Amphipod *Apocorophium lacustre* Common darter *Sympetrum striolatum* Depressed river mussel *Pseudanodonta complanate* German hairy snail *Perforatella rubiginosa* Large-mouthed valve snail *Valvata macrostoma* Norfolk aeshna *Anaciaeschna isoceles* Marsh pond snail *Stagnicola palustris/fuscus/corvus* Mayflies (*Greendrakes*) *Ephemera lineata* Scarce chaser *Libellula fulva* Scarce emerald damselfly *Lestes dryas* Three caddis flies *Ceraclea senilis*, *Hydroptila cornuta*, *Hydroptila simulans* White-legged damselfly *Platycnemis pennipes*
Aquatic macrophytes	Borrer's saltmarsh-grass *Puccinellia fasciculata* Flat-stalked pondweed *Potamogeton friesii* Floating water-plantain *Luronium natans* Fringed water-lily *Nymphoides peltata* Grass-wrack pondweed *Potamogeton compressus* Greater water-parsnip *Sium latifolium* Lesser water-plantain *Baldellia ranunculoides* Opposite-leaved pondweed *Groenlandia densa* Rootless duckweed *Wolffia arrhiza* Sharp-leaved pondweed *Potamogeton acutifolius* Short-leaved water-starwort *Callitriche truncata* Small water-pepper *Persicaria minor* Stiff saltmarsh-grass *Puccinellia rupestris* Tasteless water-pepper *Persicaria mitis* Tubular water-dropwort *Oenanthe fistulosa* Water mint *Mentha aquatica* Water-soldier *Stratiotes aloides* Water-violet *Hottonia palustris* Whorled water-milfoil *Myriophyllum verticillatum*

Invasive and non-native species

10.4.33 The 2020 to 2022 SRO Monitoring Programme includes bespoke INNS surveys within the EIA Scoping Boundary study area and River Thames study area at eight sites as presented within the Gate 2 evidence report[178]. Further survey work on INNS will be undertaken to inform the EIA.

Habitats (including priority habitats)

10.4.34 Aquatic habitats within the EIA Scoping boundary study area include the freshwater River Thames, estuarine River Thames (Thames Tideway), River Crane, Duke of Northumberland's River and Whitton Brook. The River Crane is classed as priority habitat (rivers which exhibit a high degree of naturalness), a habitat which is relatively rare in the UK.

10.4.35 Small areas of the estuarine priority habitat of mudflats are also found along the estuarine River Thames (Thames Tideway) within the EIA Scoping Boundary study area, near Isleworth Ait and at Syon Park.

10.4.36 While areas of the EIA Scoping Boundary study area fall within the River Crane waterbody and in proximity to the Whitton Brook, no construction works are planned which would be in hydraulic connectivity to the river features.

10.4.37 A summary of the relevant receptors requiring further consideration is provided in Table 10.4 and can be seen in Plan 10.1 in Appendix A Plans.

Future evidence base

10.4.38 No significant change to the current baseline environment is envisaged. Any effect from climate change would be unlikely to significantly alter the land use/rivers and, therefore, the habitats prior to the construction of the Project. Long term impacts from climate change could alter the species composition and types of habitats in and around the EIA Scoping Boundary and, thus, the types and diversity of fauna. However, it is not anticipated that the combined impact of the Project and climate change would be any different to the impact of climate change in isolation (i.e. without the Project) and any habitat creation will be designed to be resilient to climate change.

10.5 Sensitive Receptors and Potential Environmental Effects

Sensitive receptors

10.5.1 The receptors to be considered as part of the aquatic ecology assessment are listed in Table 10.2, with detailed lists of sensitive receptors provided in Table 10.4 and Table 10.5.

Potential environmental effects

10.5.2 The potential environmental impacts and effects on aquatic ecology during construction and operation of the Project are outlined below. The impacts and effects have been identified with reference to the CIEEM Guidelines[191] for EcIA and in consideration of the sensitivity of the baseline biological communities and the proposed construction and operational activities. Some effects associated with the operation of the Project may provide positive impacts.

Construction

Direct habitat loss/severance

10.5.3 Direct habitat loss and severance of habitat could have an adverse impact on the distribution and abundance of species. Along with changes in habitat (e.g. habitat gain or loss) this could also alter the composition of aquatic communities. These effects are likely to be limited to the study area in and around the proposed intake and outfall structures.

10.5.4 The new intake and outfall structures on the bank or within the freshwater River Thames would likely result in the loss of some riparian habitat and potentially marginal watercourse habitat. If additional bed or bank protections were to be required there may be a localised impact on the morphology of the channel. Such construction activities could reduce temporarily or permanently the habitat availability for aquatic communities resulting in a potential loss of diversity and/or abundance.

Species disturbance, injury or mortality

10.5.5 There is also a risk that aquatic species could be disturbed, injured or killed during the construction phase, particularly during works to construct the intake and outfall structures.

10.5.6 Construction activities, such as pile driving, heavy machinery operation, and tunnelling, can generate vibrations that may disrupt these vibration sensitive habitats and species. Impacts may include the displacement of species, disruption of reproductive cycles and disturbance to fish migration.

10.5.7 Such risks would require management in the context of localised construction activities associated with the freshwater River Thames (intake/outfall location). This would be set out as part of the Code of Construction Practice (CoCP) which would include the use of good practice guidance. With the application of management measures significant effects on aquatic species within the freshwater River Thames during construction are considered unlikely.

Changes in flow

10.5.8 During construction of the intake and outfall structures there could potentially be temporary changes in the hydrological function of the freshwater River Thames which could affect aquatic communities. No significant changes are anticipated for the tidal River Thames.

Changes in water quality

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

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

Introduction and spread of INNS

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

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

10.5.13 The construction activities associated with the Project within or adjacent to watercourses identified as having a potential to affect aquatic ecology sensitive receptors include:

- Construction of shaft sites in proximity to watercourses with potential for pollution and sedimentation issues, noise (i.e. piling) and vibration disturbance
- Construction of the outfall upstream of Teddington Weir and intake upstream of the recycled water discharge location along the River Thames (including activities such as in-river construction, removal of bank vegetation, earthworks and associated drainage)

10.5.14 The construction activities listed above have the potential to effect habitats and species in the aquatic environment in the following ways:

- Management changes to habitats such as pruning/clearance leading to habitat degradation
- Disturbance of individuals or groups of protected and notable species via noise (i.e. piling), vibration and visual disturbance
- Change of behaviours (such as migration, hibernation or reproduction) associated with timing of construction works
- Direct injury or mortality of individual animals and plants.
- Spreading of INNS
- Pollution e.g. sediment mobilisation, dust, hydrocarbons (habitat degradation and injury/mortality to species)

10.5.15 Construction/deployment of temporary pontoons and use of barges to transport materials at the intermediate shaft site, intake and outfall sites may result in the following effects on aquatic ecology:

- Changes to aquatic and riparian habitats (including the effects of shading)
- Temporary localised changes to water quality due to increased boat traffic
- Temporary disturbance from increased boat traffic due to use of barges for transport of materials

Operation

10.5.16 The operation of the Project would include the following changes within the EIA scoping boundary and would be assessed within the study areas:

- A new abstraction from the River Thames just upstream of Teddington Weir
- A new discharge of recycled water to the River Thames just upstream of Teddington Weir
- A change in the existing discharge from Mogden STW (existing infrastructure) in the tidal River Thames from reductions in volume of final effluent in proximity to Isleworth Ait LNR

10.5.17 The operational changes listed above could potentially have the following effects on sensitive habitats, statutory and non-statutory designated nature conservation sites and species in the aquatic environment:

- Localised increased velocities and the resulting impact on:
  - Upstream and/or downstream migration of Atlantic salmon, sea trout, shad, smelt, lamprey and European eel
  - Local migration of coarse fish and brown trout to spawning areas
- Changes in marginal habitats (including any areas of priority habitats) and designated sites
- Loss/decrease in habitat quantity and quality due to changes in hydraulics (i.e. increased velocity and depth) resulting in increased competition for space

- Loss of or changes to juvenile and adult fish habitats within margins due to increased wetted width, velocities, and temperature, including habitats for protected species
- Risk of displacement of juvenile fish at the outfall location due to increased velocity
- Risk of impingement of fish (all life stages) at the new intake structure. Impingement relates to fish becoming trapped/killed upon the water abstraction intake screen
- Changes to concentrations of olfactory chemicals effecting fish migration, particularly of salmonids
- Changes in water quality and temperature could have an effect on fish, macroinvertebrate and macrophyte populations
- Changes in the availability of food (biofilm, macrophytes, macroinvertebrates) due to increased flows and changes in water quality
- Bed and bank scour and potential accretion at new intake and outfall resulting in changes to aquatic habitat structure and composition
- Changes to physico-chemical water quality from existing discharge (Mogden STW) and treated effluent (outfall) resulting in a change in tidal River Thames habitat conditions

10.6 Assessment Methodology

Introduction

10.6.1 The ecological assessment would be undertaken with reference to recognised guidance given and CIEEM Guidelines[192]. The assessment methodology itself is semi-quantitative, based on empirical data and professional judgement.

10.6.2 The aims and objectives of the assessment are to:

- Determine the value/importance of ecological features (or receptors) to be affected by the Project)
- Assess the significance of the effects on both the ecology of the EIA Scoping Boundary and surrounding aquatic ecological features (i.e. study areas) and characterise the effects (e.g. extent, magnitude, duration, reversibility, timing and frequency)
- Identify cumulative effects
- Identify likely significant effects on aquatic ecology in the absence of any mitigation
- Identify mitigation measures to avoid, minimise and/or reduce the likely significant effects and identify additional enhancement measures, and
- Establish residual likely significant effects after mitigation has been implemented

Determining the value/importance of ecological features

10.6.3 The sensitive receptors identified in section 10.5 would be attributed a value/ importance according to the criteria set out in Table 10.6, which has been created following CIEEM Guidelines[166]. Consideration would also be given to distinguishing both biodiversity value and legal status.

Table 10.6 Criteria for determining the value/importance of ecological features

Value	Criteria
International and European	An internationally designated site or candidate site, i.e. a SPA, provisional SPA, SAC, candidate SAC, Ramsar site, or area which would meet the published selection criteria for designation. A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat that is essential to maintain the viability of a larger whole. Sites supporting populations of internationally or European important species.
National (England)	A nationally designated site, i.e. SSSI, NNR, or discrete area which would meet the published selection criteria for national designation (e.g. SSSI selection guidelines). A viable area of a priority habitat identified in the UK Biodiversity Action Plan (BAP), or smaller areas of such habitat essential to maintain wider viability. Viable populations of nationally important species that are of threatened or rare conservation status, including those identified as priority species in the UK BAP.
Regional (South East)	Sites that exceed the Metropolitan-level designation but fall short of SSSI selection criteria. Smaller areas of key habitat identified in the UK BAP that is essential to maintain wider viability. Viable populations of nationally scarce species identified in Regional or Metropolitan BAP and/or regularly occurring populations of a regionally important species.
Metropolitan/ County (Greater London)	Sites recognised by local authorities, e.g. Sites of Metropolitan Importance (SMI), SINC or considered to meet published ecological selection criteria for such designation. A viable area of key habitat identified in the London BAP. A LNR designated as one of the best for habitats and/or species assemblages in the Metropolitan area.

Value	Criteria
	Viable populations of regionally scarce species identified in Regional or Metropolitan BAP and/or regularly occurring populations of a species important at the metropolitan scale.
Borough/ District (LBH, LBR, RBK)	Sites recognised by local authorities, e.g. Sites of Borough Importance or considered to meet published ecological selection criteria for such designation. A viable area of habitat identified in the District BAP. A LNR designated as one of the best for habitats and/or species assemblages in the Borough area. Viable populations of species identified in the Metropolitan BAP and/or regularly occurring populations of species important at the Borough scale.
Local (e.g. within 1km of the site)	Areas of habitat or populations/assemblages of species that appreciably enrich the local habitat resource (e.g. ponds). Sites that retain other elements of semi-natural aquatic vegetation due to their size, quality or the wide distribution within the local area are not considered for the above classifications. Viable populations of species identified in the Borough BAP and/or regularly occurring populations of species important at the Local scale.
Within the zone of influence only	Sites that retain habitats and/or species of limited ecological importance due to their size, species composition or other factors.

10.6.4 The next step is to determine which ecological features are of sufficient importance to be included in the assessment, with CIEEM Guidelines[193,166] recommending this approach to ensure attention is focussed on those receptors that are susceptible to effects. Therefore, the thresholds for inclusion within the Ecological Impact Assessment (EcIA) are defined as:

- Any sites, habitats and/or species that are considered to be of at least Local biodiversity value
- Sites, habitats and/or species that receive legal protection or are referenced in policy (e.g. BAPs), and
- Habitats forming corridors and commuting networks for important species

Characterising effects

10.6.5 Once importance has been assigned to the ecological features and those of sufficient importance for inclusion have been identified, an assessment of the likely effects on the features arising from the Project will be undertaken.

10.6.6 In the CIEEM Guidelines for EcIA in the UK and Ireland[166], the terms "impact" and "effect" have specific meanings. Impact refers to the actions that result in changes to an ecological feature. For example, construction activities, such as the removal of a hedgerow, would be considered an impact. It is essentially the direct cause of change. Effect is the outcome or consequence of an impact on an ecological feature. For instance, the effect of removing a hedgerow might be a decrease in the local dormouse population due to the loss of habitat. The effect represents the broader consequences of the impact on the ecosystem.

10.6.7 The identification of effects refers to ecological structure and function, and the effects are assessed in the context of the predicted baseline conditions. Assessment has taken account to potential future change with regard Climate Change which is detailed in Chapter 15. In that context, we consider that there is not likely to be significant changes to the baseline conditions described in this chapter. When describing ecological effects, reference will be made to the following characteristics as required:

- Positive or negative impact, according to whether the change is in line with nature conservation objectives and policy
- Magnitude – refers to the size, amount, intensity and volume of an effect, in quantitative terms where possible (e.g. the amount of habitat lost, percentage change to habitat area, percentage decline in a species population)
- Extent – the spatial or geographical area over which an effect may occur
- Duration – the time period for which an effect is expected to last. Effects may be described as short, medium or long-term, and permanent or temporary. These periods are defined in Chapter 5 EIA Methodology
- Reversibility – a permanent effect is one from which recovery is not possible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation
- Timing and frequency – the number of times an activity occurs will influence the resulting effect. This should consider whether effects are constantly ongoing, separated but recurrent or single events and whether they occur during critical seasons or life-stages of habitats or fauna

Determining ecologically significant effects

10.6.8 An ecologically significant effect is defined by CIEEM[166] as 'an impact (positive or negative) on the 'integrity' of a defined site or ecosystem and/or on the conservation status of habitats and species within a given geographical area'. A definition of 'integrity' is provided in the Government Circular: Biodiversity and Geological Conservation[194]: 'The integrity of a site

is the coherence of its ecological structure and function, across its whole area that enables it to sustain the habitat, complex of habitats and/or levels of populations of the species for which it was classified'. The value of the feature that may be affected by the Project and the type of effect will be considered when determining the geographical scale at which the effect is deemed to be a likely significant effect for the purposes of this assessment as detailed in Table 10.7.

Assessment of residual likely significant effects

10.6.9 As part of the design and assessment process, measures to deliver ecological mitigation, enhancement and compensation will be reviewed, with any subsequent implementation secured through a Code of Construction Practice (CoCP).

10.6.10 Residual likely significant effects are defined as likely significant ecological that remain following the implementation of proposed mitigation measures. An assessment of residual effects will be undertaken to determine the significance of their effects on ecological features as a result of the Project.

Assessment of cumulative impacts and effects

10.6.11 Inter project cumulative effects resulting from other proposed developments within the study areas which may have effects on aquatic ecology additional to the Project. Future assessment will assess the effects of the Project in conjunction with other developments as set out in Chapter 19 Cumulative Effects.

10.6.12 Intra project effects arise from interaction between different impacts from the same project on the same receptor. For example, in relation to aquatic ecology cumulative effects may arise from both changes in water quality or quantity. Effects on aquatic ecology from the Project may also interact with other impacts to affect a non-ecological receptor, for example, effects associated with loss of habitat and construction noise may result in an area being less attractive to visit, thereby affecting landscape and recreation. Such cumulative effects will be assessed within the various technical chapters of the ES.

10.7 Mitigation

10.7.1 The need for, and the appropriate approach to, mitigation would vary according to the nature of the potential impact on aquatic ecology. Further baseline assessment work will be undertaken as part of the EIA to help inform the likelihood of impacting protected species and habitats, and to establish the full extent of the mitigation proposals.

10.7.2 Potential mitigation measures to be considered further during the assessment are subject to the results of further work and investigations but could include:

Construction phase mitigation

Primary

- Retaining ecological features where reasonably practicable such as by siting of temporary compounds, laydown areas and access in areas of least ecological sensitivity

Secondary

- At this stage, no additional mitigation measures are considered necessary. However, additional mitigation measures may be identified during continued engagement with Natural England, the EA, local wildlife trusts, and relevant planning authorities and through the aquatic ecology assessment process
- Implementation of effective drainage systems and pollution control measures

Tertiary

- The management of environmental incidents and accidents, e.g. spillages, noise, emissions through the adherence to guidance.
- The application of good practice measures (such as exclusion zones) to manage and minimise likely significant effects during construction stage to designated sites, priority habitats and protected, priority and notable species
- Obtaining any relevant protected species licences

Operation phase mitigation

10.7.3 Design developed mitigation for operational effects will be predominantly considered through primary mitigation by design iterations to the intake and outfall and the permitting of the proposed operating regime. A number of mitigation measures have already been incorporated into the current design and are detailed in Chapter 3 Design Evolution, but further mitigation and design measures will be considered during the assessment process and continue to be evaluated.

Biodiversity Net Gain

10.7.4 The Project will meet a 10% Biodiversity Net Gain (BNG), in accordance with the requirements of the Environment Act 2021. The objective of the BNG will be to leave the natural environment in a measurably better state than prior to the Project, through habitat creation and/or enhancement.

10.8 Summary of Scope for the EIA

10.8.1 A summary of receptors or impact pathways to be scoped in or out of the ES is provided in Table 10.7.

Table 10.7 Summary of scope for aquatic ecology

Potential sensitive receptors	Potential effects				Comments
	Construction	Scoped In/Out	Operation	Scoped In/Out	
Phytoplankton	From intake/outfall site with potential pathway to aquatic environment during construction: aquatic ecology effects including habitat loss/severance, changes in the flow regime and water quality, and the introduction of INNS which could result in species disturbance, injury and mortality. Temporary disturbance and degradation of the aquatic environment due to construction noise, vibration and light pollution, as well as the potential for increased boat traffic from the use of barges for sites on the right hand bank of the river (facing	IN	From intake/outfall site with potential pathway to aquatic environment during operation: aquatic ecology effects include changes to the flow regime, water quality and temperature which may result in temporary changes to the availability of habitats for aquatic species, displacement of juvenile fish, disruption to fish migration and change in level of olfactory inhibitors due to the outfall discharge for the duration of operation. At intake location, potential for fish impingement/entrainment on intake screens during the period of operation.	IN	Scoped in for construction due to potential effects on water quality which could affect aquatic ecology receptors. Scoped in for operation due to potential changes to hydrology, water quality and localised geomorphology, which could affect aquatic ecology receptors.
Phytobenthos (diatoms)		IN		IN	
Aquatic macrophytes and microalgae		IN		IN	
Aquatic macroinvertebrates		IN		IN	

Potential sensitive receptors	Potential effects				Comments
	Construction	Scoped In/Out	Operation	Scoped In/Out	
Fish	downstream) (feasibility to be assessed) and potential use of temporary pontoons to transport materials during construction.	IN		IN	
INNS		IN		IN	
Protected and notable species		IN		IN	
Habitats and priority habitats		IN		IN	
Phytoplankton Phytobenthos (diatoms) Macrophytes and macroalgae Macroinvertebrate Fish Protected and notable species INNS	From the intermediate shaft site and Northweald lane site: aquatic ecology effects including habitat loss/severance, changes in the flow regime and water quality, and the introduction of INNS. This could result in species disturbance, injury and mortality.	IN	No operational activities are identified at intermediate shaft site which would be linked to water environment and therefore no likely significant effects.	OUT	Scoped in for construction due to potential effects on water quality which could affect aquatic ecology receptors. No significant operational effects are expected at this site as following completion of construction there is no direct pathway for

Potential sensitive receptors	Potential effects				Comments
	Construction	Scoped In/Out	Operation	Scoped In/Out	
Habitats and priority habitats					ongoing impacts during operation.
Phytoplankton, Phytobenthos (diatoms), Macroinvertebrates and Fish Macrophytes and Macroalgae, Protected and notable species INNS Habitats and priority habitats	At TLT connection shaft (Tudor Drive) and Mogden STW: not in proximity to watercourse or aquatic species/no pathways for impact.	OUT	At TLT connection shaft (Tudor Drive) and Mogden STW: not in proximity to watercourse or aquatic species/no pathways for impact.	OUT	Scoped out for construction and operation as no pathway to effect identified due to lack of hydraulic connection. Further detailed in Chapter 13 Water Resources and Flood Risk.
Statutory and non-statutory designated sites	From intake/outfall site with potential pathway to aquatic environment during construction: potential temporary changes to surface water quality from construction activities and	IN	From intake/outfall site with potential pathway to aquatic environment during operation: potential operational phase impact on flows, velocities, and river temperature downstream of outfall. Temporary or permanent change to hydrological	IN	Scoped in for construction due to potential effects on water quality and transport of INNS, and disturbance to aquatic habitats which could

Potential sensitive receptors	Potential effects				Comments
	Construction	Scoped In/Out	Operation	Scoped In/Out	
	pollution due to construction runoff. Accidental movement of bankside pollutants and INNS into waterbodies with potential effects on aquatic ecological receptors. Temporary disturbance and degradation of the aquatic environment due to construction noise, vibration and light pollution, as well as the potential for increased boat traffic from the use of barges for sites on the right hand bank of the river (facing downstream) (feasibility to be assessed) and potential use of temporary pontoons to transport materials during construction.		features, localised scour and changes in local velocities. Potential changes to surface water quality for the duration of operation including improvement in discharge water quality as a result of the tertiary treatment plant (TTP).		affect aquatic ecology receptors. Scoped in for operation due to potential changes to hydrology, water quality and localised geomorphology, which could affect aquatic ecology receptors
Statutory and non-statutory designated sites	At the intermediate shaft and Northweald lane sites: potential temporary changes	IN	At the intermediate shaft sites: No likely significant effects as no	OUT	Scoped in for construction due to potential effects on

Potential sensitive receptors	Potential effects				Comments
	Construction	Scoped In/Out	Operation	Scoped In/Out	
	to surface water quality from construction activities and pollution due to construction runoff. Accidental movement of bankside pollutants and INNS into waterbodies with potential effects on aquatic ecology receptors.		disturbance/pathway for impacts outside of construction activities		water quality and transport of INNS which could affect aquatic ecology receptors. No significant operational effects are expected at this site as following completion of construction there is no direct pathway for ongoing impacts during operation.
Statutory and non-statutory designated sites	At TLT connection shaft (Tudor Drive) and Mogden STW: not in proximity to watercourse or aquatic habitats/no pathways for impact.	OUT	At TLT connection shaft (Tudor Drive) and Mogden STW: not in proximity to watercourse or aquatic habitats/no pathways for impact.	OUT	Scoped out for construction and operation due to lack of pathways for impact to aquatic environment.

Potential sensitive receptors	Potential effects				Comments
	Construction	Scoped In/Out	Operation	Scoped In/Out	
All Identified Aquatic Ecology Receptors	Conveyance tunnel will be located at sufficient depth and within the London Clay and will not be in hydraulic connectivity with surface waters and therefore no pathways for impact identified.	OUT	Conveyance tunnel will be located at sufficient depth and within the London Clay and will not be in hydraulic connectivity with surface waters and therefore no pathways for impact identified.	OUT	Scoped out for construction and operation due as no identified pathways to effect aquatic environment.

11 Ground Conditions and Contaminated Land

11.1 Introduction

11.1.1 This chapter of the Environmental Impact Assessment (EIA) Scoping Report sets out the proposed scope of the EIA in relation to effects on bedrock geology and superficial deposits, including geological designations and sensitive/valuable non-designated features; effects on soil resources; and effects from contamination on human health, surface water and groundwater both within the Project sites (shaft and infrastructure locations) and on adjacent and nearby sites. The chapter should be read in conjunction with the description of the Project as presented in Chapter 2 The Project. The Project comprises the following principal components:

- Mogden sewage treatment works (STW) Western Work Area – drive shaft
- Mogden STW Eastern Work Area – interception shaft and tertiary treatment plant (TTP)
- Recycled water conveyance tunnel between the new TTP and the proposed outfall
- Ham Playing Fields or Ham Street Car Park – intermediate shaft
- Burnell Avenue – reception shaft, connection shaft, new outfall for the discharge located close to Teddington Weir, and a new abstraction intake located approximately 150m upstream of the new outfall discharge
- Northweald Lane or Tudor Drive – Thames Lee Tunnel (TLT) connection shaft

11.1.2 Land contamination in the context of this assessment is defined as the presence of substances in, on or under the land, that have the potential to cause harm to receptors, whether this is to the environment (i.e. groundwater or controlled waters) or to human health.

11.1.3 The key issues to be considered are listed below:

- Is the Project likely to have significant effects on designated geological sites (statutory or non-statutory)?
- Is the Project likely to have significant effects on the function or quality of soil as a resource?
- Is the Project likely to have significant effects on agricultural land classified as best and most versatile (BMV) or prime land?
- Is the Project likely to disturb historical contamination?
- Is the Project likely to introduce significant sources of contamination?

11.1.4 The assessment will focus on the impacts during construction (including demolition and excavation) and operation. The effects associated with decommissioning activities of the Project have not been considered (see 5.6.21).

11.1.5 Surface water quality and groundwater quality are considered further in Chapter 13 Water Resources and Flood Risk. This chapter assesses surface water and groundwater as potential receptors to contamination derived from the presence of historical or introduced ground and groundwater contamination.

11.2 Consultation and Engagement

11.2.1 Non-Statutory Public Consultation was undertaken from October 2023 to December 2023 to seek feedback about the site options for the Project from a variety of people such as landowners, residents, businesses, local authorities, and other statutory bodies who might be affected by and interested in the Project. In relation to ground conditions and contaminated land the responses tended to be focused on the anecdotal information associated with the infilled ground around the Ham Lands area and issues with subsidence around the Lebanon Park area in Twickenham.

11.2.2 On 17 July 2024, a further engagement was held with representatives of the three London boroughs via video link. The Project team outlined the baseline environment in relation to ground conditions and land contamination, the proposed assessment methodology, and identified matters proposed to be scoped in or out from the assessments. No comments were raised from the attendees in relation to these matters. However, two questions were raised. The first was about transporting excavated contaminated spoil through the local road networks. The project team confirmed that this would be assessed in more detail following the ground investigation works. The second related to groundworks in Mogden STW Western Work Area and its proximity to a historical landfill. It was noted that the proposed work area should be outside the landfill boundary and that the ground investigation works would look to confirm this.

11.2.3 No other engagement or consultations have been undertaken to date for this aspect; however, comments would be sought from consultees such as the Environment Agency, and local authority Environmental Health, through submission of the EIA Scoping Report.

11.3 Legislation and Policy Review

11.3.1 Key policy relevant to Ground Conditions and Land Contamination set out in the Department for Environment, Food and Rural Affairs (Defra) National Policy Statement (NPS) for Water Resources Infrastructure[195]

- Paragraph 4.10.4 Development of land will affect soil resources, including physical loss of and damage to soil resources, through land contamination and structural damage. Indirect impacts may also arise

from changes in the local water regime, organic matter content, soil biodiversity and soil process

- Paragraph 4.10.5 For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination. Risks would require consideration in accordance with the contaminated land statutory guidance as a minimum. The guidance is published under Part 2A of the Environmental Protection Act 1990[196] and provides detail on when land may be designated as contaminated by the Environment Agency
- Paragraph 4.10.15 Where required, a preliminary assessment of ground instability should be carried out at the earliest possible stage. Applicants should ensure that any necessary investigations are undertaken to ascertain that the site is and will remain stable, or can be made so, as part of the development. The site needs to be assessed in context of surrounding areas where subsidence, landslides and land compression could threaten the development during its anticipated life or damage neighbouring land or property. This could be in the form of a land stability or slope stability risk assessment report
- Paragraph 4.10.17 The applicant can minimise the direct effects of a project on the existing use of the proposed site, or proposed uses near the site, by the application of good design principles, including the layout of the project and the protection of soils during construction

11.3.2 In addition to the policy set out in the NPS for Water Resources Infrastructure, the Project will also have regard to the relevant key legislation, policy and guidance for this aspect as listed in Table 11.1.

11.3.3 A detailed summary of the legislative, policy and guidance framework for this aspect, and how the Project accords with it will be provided in the Preliminary Environmental Information Report and Environmental Statement (ES).

Table 11.1 Relevant legislation, policy and guidance

Relevant legislation, policy and guidance
Legislation
Part 2A of the Environmental Protection Act (EPA) 1990 (the Contaminated Land Regime)
Contaminated Land (England) Regulations 2006
Contaminated Land (England) (Amendment) Regulations 2012
The Water Act 2003
The Water Resources Act 1991 (as amended)

Relevant legislation, policy and guidance
The Environmental Damage (Prevention and Remediation) Regulations 2009
Town and Country Planning (Environmental Impact Assessment (EIA)) Regulations 2017
Control of Asbestos Regulations 2012
Construction (Design and Management) Regulations 2015
National policy
NPS for Water Resources Infrastructure 2023[197]
The National Planning Policy Framework (NPPF) 2023[198]. It is noted that the NPPF (2024) was under consultation until September 2024
Regional and local policy
The London Plan 2021[199]
The London Borough of Hounslow (LBH) Local Plan 2015 - 2030[200] and the LBH Local Plan 2020 - 2041 (emerging policy)
The London Borough of Richmond upon Thames (LBR) Local Plan 2015 - 2018[201] and the LBR 'Pre-Publication' Draft Local Plan (2024)[202]
The RBK Core Strategy 2012[203] and Kingston's Local Plan 2019 - 2041 (emerging policy)[204]
Guidance
Contaminated Land Statutory Guidance (Defra, 2012)
Land Contamination: Risk Management (LCRM) (Environment Agency, 2020)
Design Manual for Roads and Bridges (DMRB) LA109 Geology and Soils (National Highways, 2019)
A New Perspective on Land and Soil in EIA (Institute of Environmental Management and Assessment (IEMA, 2022)
Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition materials: Industry Guidance (CAR-SOIL) (CL:AIRE, 2016)
Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra, 2018)

11.3.4 Paragraph 189 of the NPPF sets out that:

"*Planning policies and decisions should ensure that:*

(a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);

(b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and

(c) adequate site investigation information, prepared by a competent person, is available to inform these assessments."

11.3.5 Paragraph 190 of the NPPF sets out that:

"*Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner*."

11.3.6 Land stability issues, such as subsidence, embankment stability and risk of encountering collapsible ground, will be investigated as part of the ongoing ground investigation for the Project and assessed by the design team. It is anticipated that any potential issues or risks related to the stability of land and property will be mitigated by design alterations (primary mitigation). Therefore, there will be no significant effects on land and property on the surface as a result of tunnelling activities, and this aspect will be scoped out. The findings and conclusions on land stability from the subsequent ground investigation report, and associated reports, will however be summarised in the ES.

11.4 Existing Environment and Baseline Conditions

11.4.1 The study area comprises the EIA Scoping Boundary and an area extending 250m from the EIA Scoping Boundary. This study area has been chosen based on National House Building Council (NHBC) and Environment Agency (EA) guidance[205] and is considered appropriate and proportionate in the context of the Project, considering the distance over which contamination is likely to migrate and the location and type of sensitive off-site receptors.

11.4.2 The baseline for the study area has been assessed using environmental and geological data obtained from opensource data sources, including British Geological Survey Geology (BGS) digital mapping data[206], and purchased from Groundsure Ltd (Groundsure), plus historical mapping purchased from Groundsure.

11.4.3 Future baseline conditions have not been included in this assessment as at this stage it is not possible to predict what changes may occur within the EIA Scoping Boundary to affect ground conditions or result in changes to receptors. However, it is considered that any contamination remediation or mitigation measures which may be required for the Project would improve the current condition of areas requiring such measures and reduce contamination risks or block potential contamination linkages. Furthermore, based on the likely evolution of the baseline environment without the implementation of the Project, the geology, soils, and groundwater and surface water quality would not change. Future developments within the EIA Scoping Boundary would likely require their own land contamination assessments.

Geology

11.4.4 The identified artificial and superficial and bedrock geologies are listed in Table 11.2, and the superficial and artificial geologies are shown in Figure 11.1 (created from an extract of BGS mapping data). The geological units are located within the EIA Scoping Boundary unless indicated otherwise.

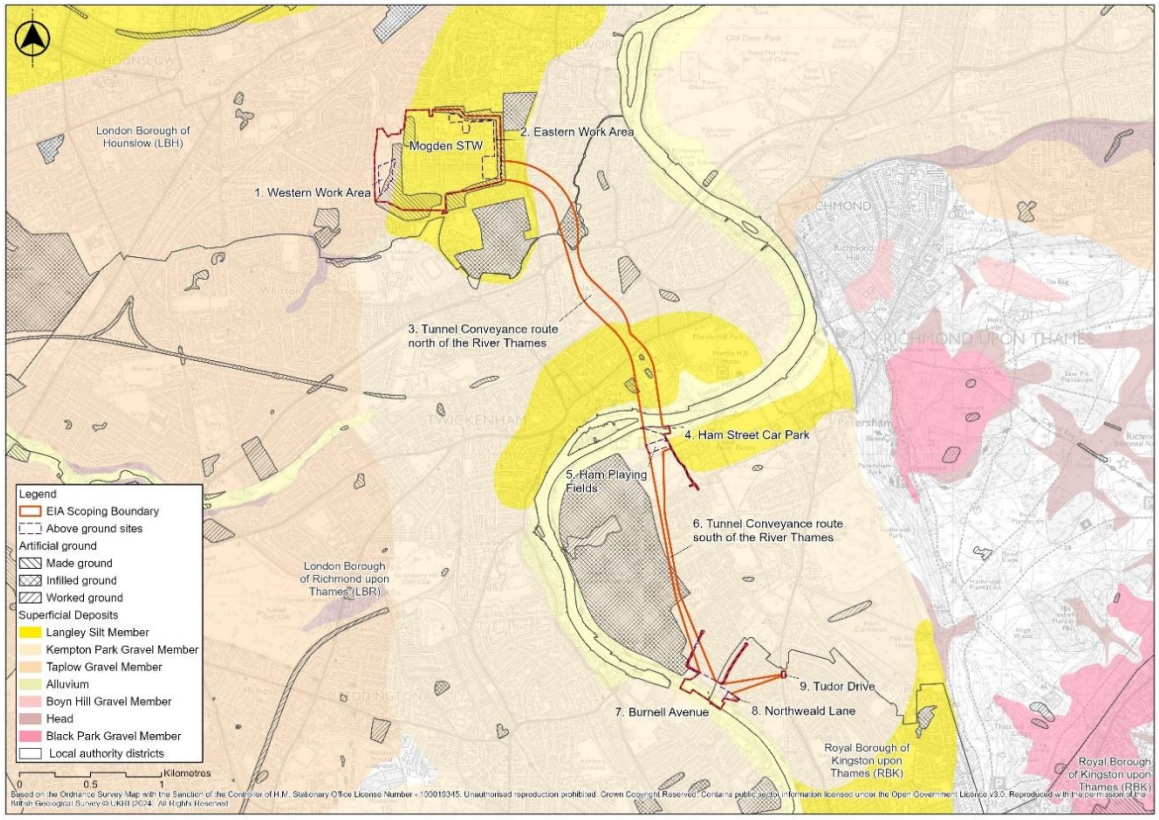


Figure 11.1 Superficial and artificial deposits in the vicinity of the Project

Table 11.2 Geology of the shafts, tunnel conveyance route and surrounding areas

Location	Artificial	Superficial	Bedrock
Mogden Sewage Treatment Works (STW) Western Work Area – drive shaft site	Made Ground (anthropogenic ground in which the material has been placed without engineering control, and/or manufactured in some way, or arising from an industrial process)	Taplow Gravel Member Langley Silt Member – located 80m west of the site	London Clay Formation
Mogden STW Eastern Work Area – interception shaft site and TTP	Made Ground	Langley Silt Member	London Clay Formation
Conveyance route north of the River Thames	Infilled Ground	Langley Silt Member Kempton Park Gravel Member	London Clay Formation
Ham Playing Fields - intermediate shaft	Made Ground – 200m southwest	Kempton Park Gravel Member	London Clay Formation
Ham Street Car Park - intermediate shaft	None within the shaft site, the EIA Scoping Boundary or within 250m of the EIA Scoping Boundary	Alluvium	London Clay Formation
Conveyance route south of the River Thames	None within the conveyance route, the EIA Scoping Boundary or within 250m of the EIA Scoping Boundary	Alluvium Kempton Park Gravel Member	London Clay Formation
Burnell Avenue – reception shaft, connection shaft, new outfall for the discharge located close to Teddington Weir, and a new abstraction intake	Made Ground – 165m northwest	Kempton Park Gravel Member Alluvium – 20m southwest	London Clay Formation

Location	Artificial	Superficial	Bedrock
located approximately 150m upstream of the new outfall discharge			
Northweald Lane – TLT connection shaft			
Tudor Drive – TLT connection shaft	None within the shaft site, the EIA Scoping Boundary or within 250m of the EIA Scoping Boundary	Kempton Park Gravel Member	London Clay Formation

11.4.5 The depth of the recycled water conveyance tunnel would be between 20-30m for the majority of the route with the final alignment and profile to be determined following further surveys and detailed design. The conveyance route is expected to be wholly within the London Clay Formation for its entire length, as indicated in the approximate geological cross-section of the conveyance route in Figure 11.2.

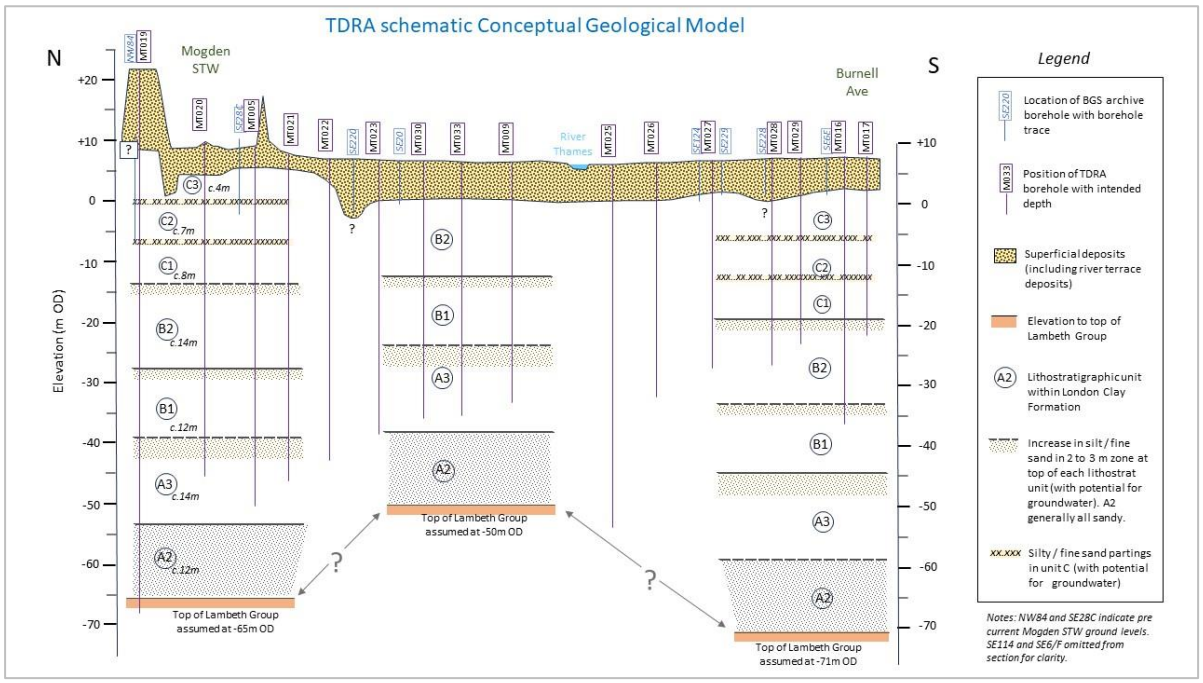


Figure 11.2 Conveyance route geological cross-section

Hydrogeology

11.4.6 The hydrogeological properties of the geological strata identified above are listed below based on the Groundsure and opensource data. Further details are also provided in Chapter 13 Water Resources and Flood Risk.

- Alluvium (clay, silt, sand and peat) – Secondary Undifferentiated
- Langley Silt Member (clay and silt) – Unproductive
- Taplow Gravel Member (sand and gravel) – Principal Aquifer
- Kempton Park Gravel Member (sand and gravel) – Principal Aquifer north of the River Thames, Secondary A Aquifer south of the River Thames
- London Clay Formation (clay, silt and sand) – Unproductive

11.4.7 Principal aquifers are described as having a geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally, principal aquifers were formerly classified as major aquifers.

11.4.8 Secondary A aquifers are described as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

11.4.9 Secondary undifferentiated aquifers are described as aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. Secondary B aquifers are mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin cracks (fissures) and openings, or eroded layers.

11.4.10 Unproductive Strata are described as rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

11.4.11 The Groundsure information and opensource data indicates that there are no groundwater source protection zones within 250m of the EIA Scoping Boundary. There is one active licensed discharge consent to controlled waters within 250m of the EIA Scoping Boundary for sewer storm overflow, located approximately 55m west of the conveyance route north of the River Thames. There are seven revoked licensed discharge consents in or within 250m of the EIA Scoping Boundary, and the effluent types include unspecified trade discharges, miscellaneous discharges (mine/groundwater and surface water), and sewer storm overflow.

11.4.12 The Groundsure and opensource data indicate there are two active groundwater abstractions for spray irrigation within 250m of the EIA Scoping Boundary, located approximately 110m west of the EIA Scoping Boundary at the Burnell Avenue site (The Lensbury).

Pollution incidents

11.4.13 The Groundsure and opensource data indicate there have been a total of 18 pollution incidents in or within 250m of the EIA Scoping Boundary. The impact of these on land ranged from Category 3 (Minor) to Category 4 (No Impact), and the impact on water has ranged from Category 2 (Significant) to Category 4 (No Impact). Details of the Category 2 pollution incidents to water in or within 250m of the EIA Scoping Boundary are provided in Table 11.3.

Table 11.3 Summary of Category 2 pollution incidents within 250m of the EIA Scoping Boundary

Location	Date of incident	Pollutant description	Incident identification number
Within the EIA Scoping Boundary, 225m south of the conveyance route, more than 250m away from Mogden STW shafts.	08/12/2009	Construction and demolition materials and waste (inert materials and wastes)	739003
Within the EIA Scoping Boundary, 187m south of the conveyance route, more than 250m away from Mogden STW shafts.	07/06/2009	Storm sewage	685449
Within the EIA Scoping Boundary, 145m north of the conveyance route, more than 250m away from Mogden STW shafts.	04/08/2002	Storm sewage	97293
Outside EIA Scoping Boundary – 55m north of the EIA Scoping Boundary (Mogden STW shaft) and close to the Duke of Northumberland's River.	01/08/2002	Urban run-off (contaminated water)	96362
Outside EIA Scoping Boundary – 10m southwest of the EIA Scoping Boundary and southwest of River Crane (close to the north of Cole Park Gardens).	16/09/2003	Other inorganic chemicals or products	190377

Hydrology

11.4.14 Hydrological features are discussed in Chapter 13 Water Resources and Flood Risk. Surface waterbodies within 250m of the EIA Scoping Boundary include:

- Duke of Northumberland's River, which runs from north to south through the middle of the Mogden STW site. This river is located more than 250m from all of the shaft sites
- River Crane, which crosses the EIA Scoping Boundary in the area near Chertsey Road and is located more than 250m from any of the shaft sites
- River Thames, which is located immediately north of the Ham Street Car Park and within 50m of the Ham Street Car Park intermediate shaft site, and within 250m of the Ham Playing Fields intermediate shaft site. The Burnell Avenue site, with associated shafts for the intake and outfall structures, are approximately 35m to 40m from the river

Landfills and waste sites

11.4.15 Historical landfill sites can pose an ongoing threat to the environment and have the potential to pollute surface and groundwaters. In general, the majority of these sites were in operation when approaches to control contamination were not as stringent. Historical landfills and waste sites, as well as waste exemptions, within close proximity to the EIA Scoping Boundary were identified using the Groundsure data and are shown in Figure 11.3.

11.4.16 Four of the landfill sites shown on Figure 11.3 are within the study area. Further details on these landfills are given in Table 11.4.

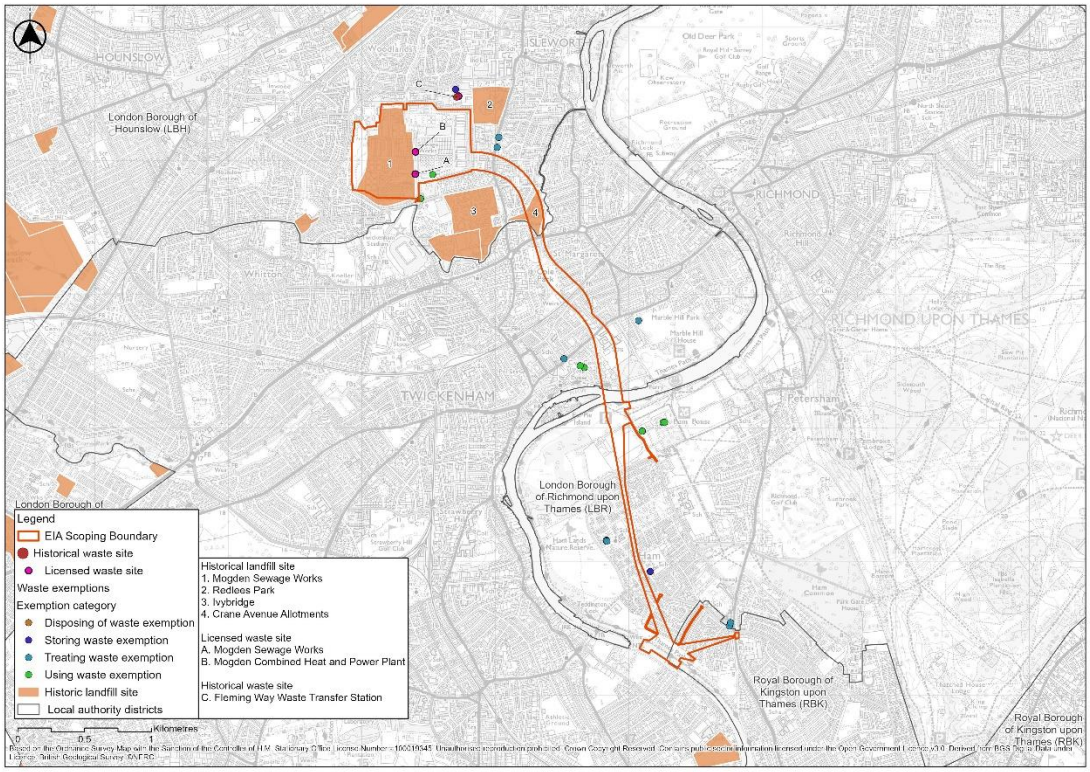


Figure 11.3 Historical landfills, historical waste sites, and waste exemptions within close proximity to the Project

11.4.17 The historical landfills in and within 250m of the EIA Scoping Boundary including the shaft sites and the conveyance route were reviewed and are noted in Table 11.4 by Project sites. The Groundsure data indicates that there are no authorised landfill sites identified within 250m of the EIA Scoping Boundary.

Table 11.4 Landfills and waste sites within 250m of the EIA Scoping Boundary

Location	Historical landfill (within 250m of the EIA Scoping Boundary)	Historical and licensed waste sites
Mogden STW Western Work Area - drive shaft	Two historical landfills within 250m of the EIA Scoping Boundary: Mogden Sewage Works historical landfill [Landfill No. 1] is located at 10m east of the shaft site (EAHLD11062), accepted inert waste from 1930-1935, and Ivybridge [Landfill No. 3] (EAHLD11374) located approximately 130m south of the EIA Scoping	There are two licensed waste site listings for Mogden Sewage Works for sludge treatment dated 15/01/2009 and Mogden Combined Heat and Power Plant (EPR/WP3533LT) landfill gas engine dated 10/06/2021. One historical waste site (Isleworth Site) 70m north of the EIA Scoping Boundary - 4 Fleming Way Waste Transfer

Location	Historical landfill (within 250m of the EIA Scoping Boundary)	Historical and licensed waste sites
	Boundary but more than 250m away from the shaft site, accepted inert and industrial waste from 1955-1966, it is equipped with gas control measures.	Station for sanitary and clinical wastes, dated 06/05/2020. This site is also listed as a licensed clinical waste transfer station.
Mogden STW Eastern Work Area - interception shaft and TTP	Two historical landfills within 250m of the EIA Scoping Boundary: Redlees Park historical landfill [Landfill No. 2] (EAHLD11059) at 200m east/northeast, accepted inert waste from 1912-1946. Ivybridge (EAHLD11374) at approximately 250m south of the shaft site and 130m south of the EIA Scoping Boundary, accepted inert and industrial waste from 1955-1966, with gas control in place.	
Conveyance tunnel north of the River Thames	Two historical landfills within 250m of the EIA Scoping Boundary: Crane Avenue Allotments historical landfill [Landfill No. 4] (EAHLD11058) located directly on the route - waste type unknown, and Ivybridge (EAHLD11374) located approximately 100m southwest, accepted inert and industrial waste 1955-1966, with gas control.	None in or within 250m of the EIA Scoping Boundary.
Ham Playing Fields - intermediate shaft	None in or within 250m of the EIA Scoping Boundary.	None in or within 250m of the EIA Scoping Boundary.
Ham Street Car Park - intermediate shaft	None in or within 250m of the EIA Scoping Boundary.	None in or within 250m of the EIA Scoping Boundary.
Conveyance tunnel south of	None in or within 250m of the EIA Scoping Boundary.	None in or within 250m of the EIA Scoping Boundary.

Location	Historical landfill (within 250m of the EIA Scoping Boundary)	Historical and licensed waste sites
the River Thames		
Burnell Avenue – reception shaft, connection shaft, new outfall for the discharge located close to Teddington Weir, and a new abstraction intake located approximately 150m upstream of the new outfall discharge	None in or within 250m of the EIA Scoping Boundary.	None in or within 250m of the EIA Scoping Boundary.
Northweald Lane – TLT connection shaft	None in or within 250m of the EIA Scoping Boundary.	None in or within 250m of the EIA Scoping Boundary.
Tudor Drive – TLT connection shaft	None in or within 250m of the EIA Scoping Boundary.	None in or within 250m of the EIA Scoping Boundary.

Soils

11.4.18 The agricultural land classification for land within the EIA Scoping Boundary was assessed using the Agricultural Land Classification – Provisional (England) mapping data. Based on this information the EIA Scoping Boundary is within an area classed as urban land and effects on agricultural land are therefore proposed to be scoped out of the assessment.

11.4.19 The Groundsure data includes the BGS estimated urban soil chemistry for the land within 50m of the EIA Scoping Boundary. The concentrations vary for different areas within this boundary, the ranges of these values have been summarised and are shown in Table 11.5. The published soil guideline values (SGV) for a public open space end use are also included in Table 11.5 to put the concentrations into context. These guideline values are protective of human health in that land use scenario, which could be considered to be the most appropriate for this Project. As shown in Table 11.5, the estimated concentrations are significantly lower than the guideline values. It will be necessary to obtain relevant soil quality data for the study area during the ongoing ground investigation in order to understand the potential impact of soil chemistry (including contamination) upon the Project

and to receptors. The outcomes of the ground investigation and subsequent data assessments will be used to develop the Ground Conditions and Contaminated Land Chapter of the ES.

Table 11.5 BGS estimated urban soil chemistry

Element	Estimated concentration (mg/kg)	Public open space end use soil guideline value (mg/kg)
Arsenic	13 – 35	170
Cadmium	0.3 – 1.8	560
Chromium	51 – 82	220
Copper	34 – 131	44,000
Nickel	14 – 46	800
Lead	107 – 799	1,300
Tin	7 – 71	N/A

Geological sites

11.4.20 The potential for Regionally Important Geodiversity Sites (RIGS)[207] within the EIA Scoping Boundary was assessed using Defra MAGIC geological places to visit mapping data[208] and London Geodiversity Partnership's list of London's geological sites[209] and local authority websites including those of the three London boroughs[210] [211] [212]. The RIGS are defined as non-statutory sites selected to protect the most important places for geology, geomorphology and soils, complementing the network of legally protected Sites of Special Scientific Interest (SSSIs). No RIGS were identified in or within 250m of the EIA Scoping Boundary based on the data available. It should be noted that mineral resources are assessed in Chapter 17 Waste and Materials.

Historical land uses

11.4.21 Previous editions of Ordnance Survey (OS) mapping spanning the period 1865 to 2024 obtained from Groundsure have been reviewed, and a summary of the potentially contaminative historical land uses in and within 250m of the EIA Scoping Boundary is presented in Table 11.6 by Project sites.

Table 11.6 Summary of Historical OS Mapping

Location	Within the EIA Scoping Boundary	Within 250m of the EIA Scoping Boundary
Mogden STW Western Work Area - drive shaft Mogden STW Eastern Work Area - interception shaft and TTP	In 1865 this area comprised mostly of fields, with a river running north to south through the centre named Duke of Northumberland's River. Mogden STW is first shown in 1894 as a small site near the centre of this area, which had expanded to cover the eastern half of the area by 1912 and was further expanded to its current boundary by 1935, at which time an embankment is shown along the southern, eastern and northern boundaries of the STW and the river's orientation has been altered slightly. On the 1962 map the sewage works has expanded significantly to a layout similar to that of the present day and a large amount of ground reprofiling. The river is in the same orientation as shown on the 1935 map but now there appears to be a culverted section approximately 130m long and the river now runs in concrete channel in the centre of the site with tunnels passing underneath. Between 1935 and 2024 the STW has continued to develop with related infrastructure being constructed in the western area of the site. Aerial imagery from 2011 indicates earthworks were undertaken in the western area of the site to	Between 1865 and 1912 the majority of the surrounding area of Isleworth comprised fields, minor roads, farms, and residential properties. Between 1933 and 1935 the number of residential and commercial properties and associated infrastructure (e.g. roads) increased significantly in the areas surrounding the STW. Potentially contaminative land uses within 250m of the EIA Scoping Boundary at this location are: • nurseries: 1912 – 1966; • unspecified heaps, pits and ground workings: 1896 – 1987; • commercial/industrial works: 1961 – 1987; • iron foundry: 1912 – 1933; • unspecified works: 1948 – 1987; • unspecified depot: 1987; • laundry: 1912 – 1933; • concrete pipes works: 1935 – 1948; • refuse heaps: 1966; and, • ambulance station: 1991

Location	Within the EIA Scoping Boundary	Within 250m of the EIA Scoping Boundary
	accommodate ten new tanks, which can be seen in the aerial image from 2015. Potentially contaminative historical land uses identified within the EIA Scoping Boundary are: • tanks: 1935 – 1991; • unspecified heaps, pits and ground workings: 1933 – 1987; • sewage purification and treatment works: 1894 – present; • industrial estate – 1987; • tunnel: 1966 – 1987; • nurseries: 1935 – 1987; • filter beds: 1912 – 1973; • film studio: 1948; • settling tanks: 1991; and, • embankment: 1935 – present	
Conveyance tunnel - north of the River Thames	Between 1865 and 1912 the majority of this area comprised fields, with multiple residential properties and a recreation ground located within the southern extents of the EIA Scoping Boundary. A river named the River Crane runs from north to south, and the Windsor Line railway crosses through the middle of the area running from northeast to southwest. In 1935 numerous residential properties were constructed in the northern area of the EIA Scoping Boundary, as well as an allotment garden. A large	The surrounding area comprised Isleworth to the north, Richmond to the east, and Twickenham to the south and west. Between 1865 and 1894 the majority of the surrounding area comprised fields, with some residential properties to the east. Residential areas and associated roads and infrastructure continued to expand from 1894 to present day. Potentially contaminative land uses within 250m of the EIA Scoping Boundary at this location are:

Location	Within the EIA Scoping Boundary	Within 250m of the EIA Scoping Boundary
	road has been constructed to the south of the allotment garden, named Chertsey Road. Potentially contaminative historical land uses identified within the EIA Scoping Boundary are: • nurseries: 1894 – 1948; • poultry appliance works: 1912 – 1933; • historical railway line: 1935 – 1973; and, • unspecified heap: 1894 – 1898	• unspecified heaps, pits and ground workings: 1894 – 1898; • historical railway line: 1935 – 1973; • railway station: 1912 – 1035; • railway buildings: 1912 – 1973; • smithy: 1894; • Unspecified works: 1966 – 1991; and, • Boat house: 1912 – 1991
Ham Playing Fields/Ham Street Car Park - intermediate shaft	In 1865 this area comprised fields bounded by the River Thames to the north and a road to the east. In 1973 two playing fields are present, the northernmost of which is Ham Playing Fields. The Ham Street Car Park is first shown in aerial imagery in 1991. No potentially contaminative historical land uses were identified within the EIA Scoping Boundary in this area.	The surrounding area comprises Twickenham to the northwest, Petersham to the east, and Ham to the south. These are residential areas which have been developed and expanded between 1865 and 2024. The majority of the area to the west/southwest has comprised fields or open parklands since 1865. Potentially contaminative land uses within 250m of the EIA Scoping Boundary at this location: • nurseries: 1933 – 1948; • unspecified pits, heaps and ground workings: 1894 – 1898; • miniature rifle range: 1933 – 1966; • rifle ranges: 1912; and, • electricity and steam works: 1894 – 1935
Conveyance tunnel - south of the River Thames	The conveyance tunnel crosses River Thames in the area immediately north of the Ham Street Car Park. Between 1865 and 1920 the tunnel route south of	The surrounding area comprises Twickenham to the northwest and Petersham to the east. These are

Location	Within the EIA Scoping Boundary	Within 250m of the EIA Scoping Boundary
	the River Thames comprised fields (named Ham Fields) and recreation grounds. In 1933 a sand and ballast works is present within the EIA Scoping Boundary, and by 1938 residential properties and roads have been developed to the south of the works. By 1966 the sand and ballast works are no longer shown, and numerous residential properties and roads are present in this area, as well as the areas within the EIA Scoping Boundary to the north. A school is shown within the EIA Scoping Boundary in the 1973 mapping. The tunnel route to the south of the River Thames currently passes below playing fields, allotments, and residential areas in the town of Ham. Potentially contaminative historical land uses identified within the EIA Scoping Boundary are: • nurseries: 1933 – 1948; • unspecified ground workings: 1896 – 1898; • miniature rifle range: 1933 – 1966; and, • rifle ranges: 1912	residential areas which have been developed and expanded between 1865 and 2024. The majority of the area to the west/southwest comprised field or open parklands since 1865. The residential areas surrounding the EIA Scoping Boundary expanded in all directions between 1966 and 1973. Potentially contaminative land uses within 250m of the EIA Scoping Boundary at this location are: • sewage works: 1912 – 1966; • rifle ranges: 1912; • sand and ballast works: 1934 – 1938; • refuse heap: 1938 – 1948; and, • nursery: 1966 – 1991
Burnell Avenue – reception shaft, connection shaft, new outfall for the discharge located close to Teddington Weir, and a new abstraction intake	Between 1865 and 2024 this area comprised fields in the northeast and the River Thames in the southwest, with a towpath running parallel with the northern bank of the river.	The surrounding area comprises Ham to the north and east, Kingston Upon Thames to the southeast, and Teddington to the west and southwest. These areas mainly comprised fields in the 1800s, with some residential areas.

Location	Within the EIA Scoping Boundary	Within 250m of the EIA Scoping Boundary
located approximately 150m upstream of the new outfall discharge. Land south of Northweald Lane – TLT connection shaft	No potentially contaminative historical land uses were identified within the EIA Scoping Boundary in this area.	The residential areas and associated infrastructure and roads were further developed and expanded between 1865 and 2024. Potentially contaminative land uses within 250m of the EIA Scoping Boundary at this location are: • motor works: 1933 – 1948; • boat house: 1934 – 1948; • pumping station: 1933 – 1938; and, • sewage tanks: 1933 – 1938
Tudor Drive – TLT connection shaft	Between 1865 and 1920 this area comprised a field adjacent to a road that ran from north to south named Upper Ham Road. In 1933 a motor works was located approximately 50m west. Between 1938 and 2024 the site is shown as an area of open space. Aerial imagery from between 1999 and 2022 shows greenery within the EIA Scoping Boundary and indicates that this area has remained largely unchanged. No potentially contaminative historical land uses were identified within the EIA Scoping Boundary in this area.	This site is located within the town of Ham, and the surrounding areas mainly comprised fields in the 1800s, with some residential areas. Potentially contaminative land uses within 250m of the EIA Scoping Boundary at this location are: • icehouse: 1913; • motor works: 1933 – 1948; • filter station: 1966 – 1991; • pumping station: 1933 – 1938; • sewage tanks: 1933 – 1938; • unspecified works: 1933 – 1983; • industrial estate: 1991; • unspecified tanks: 1912 – 1991; • allotment garden: 1920; and • fire station: 1960

Current potentially contaminative land uses

11.4.22 Current potentially contaminative land uses in and within 250m of the EIA Scoping Boundary are presented in Table 11.7 by Project sites.

Table 11.7 Current Potentially Contaminative Land Uses in and within 250m of the EIA Scoping Boundary

Location	Within the EIA Scoping Boundary	Within 250m of the EIA Scoping Boundary
Mogden STW	Sewage treatment works and associated infrastructure/activities including sludge tanks, electricity sub stations, sewage purification and sewage sludge digestions (Department for Business, Energy, and Industrial Strategy - BEIS).	Electricity substations, the closest is located 40m north.
Conveyance tunnel - north of the River Thames	Electricity substations.	Electricity sub stations, the closest is 15m southeast. Shell petrol station located 175m northwest. Unspecified works located 105m southeast.
Ham Lands (Ham Playing Fields and Ham Street Car Park)	None identified within the EIA Scoping Boundary.	Electricity substations, the closest being located 30m south. Unspecified works located 180m north.
Conveyance tunnel - south of the River Thames	None identified within the EIA Scoping Boundary.	Ham and Petersham Rifle and Pistol Club located 88m southwest. Miniature rifle range located 90m southwest.
Burnell Avenue – reception shaft, connection shaft, new outfall for the discharge located close to Teddington Weir, and a new abstraction intake located approximately	None identified within the EIA Scoping Boundary.	Kingston (London) Fire Station, 30m east. Electricity sub stations, the closest being located 15m east. BP petrol station located 75m north-east.

Location	Within the EIA Scoping Boundary	Within 250m of the EIA Scoping Boundary
150m upstream of the new outfall discharge Land south of Northweald Lane – TLT connection shaft Tudor Drive – TLT connection shaft		Gas governor located 150m north-east.

Preliminary conceptual site model

11.4.23 Based on the review of the existing study area baseline conditions and project-specific construction and operation details, the following potential sources of land contamination, exposure pathways and receptors have been identified. These will be amended and refined following the completion of the ground investigation and associated interpretive reports and will be updated in the ES.

Potential sources of land contamination

11.4.24 Excavating within areas of Made Ground, infilled ground and the embankment at Mogden STW, may pose a contamination risk to human health and groundwater in the superficial geology as the specific ground conditions are currently unknown and potentially variable. Therefore, there is potential for construction workers, nearby occupants, and groundwater to be impacted during construction works.

11.4.25 Excavating within and close to areas of historical landfills as identified in Table 11.4, may pose a ground gas risk and groundwater risk as the landfill condition and engineering is currently unknown. Therefore, there is potential for construction workers, nearby occupants, and groundwater to be impacted.

11.4.26 Contaminants introduced through the use of fuels and chemicals in the construction process, including those which may be used in tunnel and shaft construction.

11.5 Sensitive Receptors and Potential Environmental Effects

11.5.1 The following aquifers in and round the EIA Scoping Boundary are deemed vulnerable to leaching of ground contamination as they may be important in supporting local abstractions or providing baseflow to rivers and streams:

- Alluvium – Secondary Undifferentiated
- Taplow Gravel Member – Principal Aquifer

- Kempton Park Gravel Member – Principal Aquifer north of the River Thames and Secondary A Aquifer south of the River Thames

11.5.2 The London Clay Formation bedrock is an unproductive stratum which has low permeability and therefore acts as a natural aquiclude preventing leaching and movement of contaminants to groundwater and groundwater holding geology below it. The London Clay Formation underlies the whole EIA Scoping Boundary and will prevent downward migration of contamination and protect the underlying aquifers, including the Chalk, a Principal Aquifer. The design of the conveyance route tunnel currently maintains the construction within the London Clay Formation (refer to Figure 11.2). Ground investigations are being carried out to prove the base of the London Clay Formation at key locations and should the proposed conveyance penetrate the base of the London Clay Formation, groundwater sampling and detailed risk assessment should be undertaken to understand the risk. The ground investigation works, interpretation, plus some groundwater monitoring, are proposed to be completed in time to include the outcomes in the ES.

11.5.3 Other potential receptors include watercourses in proximity to the construction works and ecological receptors:

- Duke of Northumberland's River, which runs from north to south through the middle of the Mogden STW site is located more than 250m from any of the shaft sites
- River Crane, which crosses the EIA Scoping Boundary in the area near Chertsey Road is located more than 250m from any of the shaft sites.
- River Thames, which is less than 250m from the Ham Street Car Park and Ham Playing Fields shaft sites
- Aquatic ecology within the above watercourses

11.5.4 Human health receptors including construction workers, future site operators and adjacent site users (including residents).

11.5.5 The list of potential receptors will be refined as required once the detailed conceptual site model has been developed.

Potential pathways

11.5.6 Potential pathways include:

- Contaminated surface water run-off into surface water features
- Migration of leachable contaminants from made ground into shallow aquifer
- Migration of contaminants within groundwater in shallow aquifer into surface water features
- Creation of preferential pathway between shallow aquifer and deep aquifer if the London Clay Formation is penetrated

- Dermal contact/ingestion/inhalation of dust, soil or liquids
- Inhalation of ground gases, vapours and dust
- Migration of ground gases and vapours
- Direct contact of aggressive contaminants with concrete or pipes

11.5.7 Further assessment of the potential environmental effects from these receptors and pathways is provided in section 11.8.

11.6 Assessment Methodology

11.6.1 The evaluation of contamination will be in line with the technical approach presented in Land Contamination Risk Management (LCRM)[213]. This provides a technical approach for identifying and remediating contaminated land through the application of a risk management process. LCRM also sets out the approach to remediation of contaminated land.

11.6.2 The process of land contamination risk assessment, as given in LCRM, is summarised as follows:

- Develop a Conceptual Site Model – carry out a desk study review of available documentary information and identify the potential sources, pathways and receptors relevant to the site, and the potential contaminant linkages
- Gather site-specific information on the Conceptual Site Model – through site investigation if required
- Gather information on the nature and extent of contamination, details of pathways for migration of contamination and specific information on the receptors to update the model
- Risk assessment – apply criteria to determine the value/sensitivity of receptors, determine the magnitude of any impact on those receptors, consider mitigation, and make conclusions about the likely significant effects of the Project on bedrock geology and superficial deposits, including geological designations and sensitive/valuable non-designated features; effects on soil resources; and effects from contamination on human health, surface water and groundwater. These criteria must be relevant to each potential contaminant linkage, and can be generic (conservative) criteria, or can be site-specific (less conservative)

11.6.3 Ground investigation works related to the Project are currently on-going. The need for further ground investigations would be assessed in relation to the Conceptual Site Model produced as part of a land contamination risk assessment, which would be undertaken following the current ground investigation, together with any geotechnical and geo-environmental data which may already be available.

11.6.4 Risks arising from gas in the ground would be assessed and managed in accordance with the guidance in BS 8485[214] and BS 8576[215].

11.6.5 The criteria for assessing the value (sensitivity) of receptors and magnitude of impacts will be based on the methodology outlined in section 5.7 of Chapter 5 EIA Methodology, professional judgement and experience, and with regard to DMRB LA 109[216] and IEMA 'A New Perspective on Land and Soil in Environmental Impact Assessment'[217]. This provides criteria for assessing the sensitivity and magnitude of impact to geology and soil receptors and sets out how contaminant concentrations should be evaluated in order to determine magnitude of impact depending upon the receptor to the contamination (human health, surface water, groundwater). The magnitude of impact on surface water and groundwater will be influenced by DMRB LA 113[218]. The relevant content of these tables has been combined and presented as Table 11.8 and Table 11.9 below. Significance of impact would be based on the matrix provided in Figure 5.2 in Chapter 5 EIA Methodology.

Table 11.8 Determining the value/sensitivity of receptors

Value/sensitivity	Receptor type	Examples of receptors
High	Human Health	Construction workers, future site users, maintenance workers, adjacent land users and future construction workers. High sensitivity land use such as public open space, residential and allotments.
	Surface Water	Watercourse having a Water Framework Directive (WFD) classification shown in River Basin Management Plan (RBMP) 3. Nationally or internationally important site i.e. Ramsar site, Special Area of Conservation (SAC), Special Protection Area (SPA) and SSSI.
	Groundwater	Principal or highly productive aquifers with high aquifer vulnerability. Groundwater abstractions that are public water supplies. Source Protection Zone (SPZ) 1 (Inner Protection Zone) or 2 (Outer Protection Zone). Groundwater supporting nationally or internationally important site i.e. Ramsar site, SAC, SPA and SSSI. Groundwater providing locally important resource or supporting a river ecosystem. Groundwater Dependent Terrestrial Ecosystem (GWDTE).

Value/sensitivity	Receptor type	Examples of receptors
	Soil Quality	Agricultural Land Classification (ALC) Grade 1 – excellent quality soil (Best and Most Versatile (BMV)). ALC Grade 2 – very good quality (BMV) soil. ALC Subgrade 3a – good quality (BMV) soil. Soils supporting a European designated site (e.g. SAC, SPA).
	Designated Geological Sites	Internationally important geology (e.g. UNESCO Geopark). Nationally important geology (e.g. SSSI) and/or a very low capacity to accommodate change.
Medium	Human Health	Medium sensitivity land use such as commercial or industrial.
	Surface Water	Watercourses not having a WFD classification shown in a RBMP3 and Q95 greater than 0.001m³/s. Providing water for agricultural or industrial use.
	Groundwater	Secondary A aquifers. Secondary undifferentiated aquifer. Groundwater aquifer providing water for agricultural or industrial use. Licensed groundwater abstractions. SPZ3 (Source Catchment Protection Zone). Limited connection to surface water.
	Soil Quality	ALC Subgrade 3b – moderate quality soil. Soils directly supporting a UK designated site (e.g. SSSI)
	Designated Geological Sites	Geology has a local or regional designation (e.g. RIGS).
Low	Human Health	Low sensitivity land use such as highways and rail.
	Surface Water	Watercourses not having a WFD classification shown in RBMP3 and Q_{95} less than 0.001m³/s. Private water supplies located within the vicinity of a mains water supply or used for agricultural purposes and not for drinking water purposes.

Value/sensitivity	Receptor type	Examples of receptors
	Groundwater	Unproductive strata.
	Soil Quality	ALC Grade 4 – poor quality soil. ALC Grade 5 – very poor quality soil.
	Designated Geological Sites	Geology not listed but possessing key characteristics which may be locally important and/or has a high capacity to accommodate change.
Negligible	Human Health	Undeveloped surplus land/no sensitive land use proposed.
	Surface Water	Watercourse that is dry for most of the year.
	Groundwater	Unproductive strata.
	Soil Quality	No soil present. Previously developed land formerly in 'hard uses' with little potential to return to agriculture.
	Designated Geological Sites	Geology is non-distinctive and/or is likely to tolerate the proposed change, or there are no listed sites. No geological exposures, little/no local interest.

Table 11.9 Determining the Magnitude of Impact

Magnitude of impact	Receptor type	Description of Impact
Large	Human Health	Adverse: significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria (e.g. category 4 screening levels) with potential for significant harm to human health. Contamination heavily restricts future use of land. Adverse: soil contamination is considered to pose a high risk to potential receptors with one or more contaminant linkages certain to be present. Beneficial: substantial betterment of ground contamination through remediation and/or mitigation and removal of risk to receptors.
	Surface Water	Adverse: loss of regionally important public water supply (licensed surface water abstraction for public water supply).

Magnitude of impact	Receptor type	Description of Impact
		Adverse: reduction in waterbody WFD classification. Beneficial: removal of existing polluting discharge, or removing the likelihood of polluting discharges occurring to a watercourse. Beneficial: improvement in waterbody WFD status classification in a waterbody for chemical status elements or supporting elements to ecological status.
	Groundwater	Adverse: loss of, or extensive reduction in quality to an aquifer. Adverse: loss of regionally important water supply. Adverse: loss of, or extensive change to GWDTE or baseflow contribution to protected surface waterbodies. Beneficial: substantial betterment of groundwater contamination through remediation and/or mitigation and removal of risk to receptors. Beneficial: removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring. Beneficial: recharge of an aquifer.
	Soil Quality	Adverse: permanent, irreversible sealing or loss of one or more soil functions (including downgrading of ALC) over an area of >20ha. Beneficial: permanent improvement in one or more soil functions (including upgrading of ALC) over an area of >20ha.
	Designated Geological Sites	Adverse: loss of geological feature/designation and/or quality and integrity, severe damage to key characteristics, features or elements. Beneficial: major improvement to geological feature/ designation.
Medium	Human Health	Adverse: contaminant concentrations exceed background levels and are in line with limits of relevant screening criteria (e.g. category 4 screening levels). Adverse: soil contamination is considered to pose a moderate risk to potential receptors with one or more contaminant linkages present. Beneficial: moderate betterment of ground contamination through remediation and/or mitigation and removal of risk to receptors.

Magnitude of impact	Receptor type	Description of Impact
	Surface Water	Adverse: degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies. Adverse: contribution to reduction in waterbody WFD classification. Beneficial: contribution to improvement in water quality that does not lead to a change in WFD status classification.
	Groundwater	Adverse: partial loss or reduction in quality to an aquifer. Adverse: degradation of regionally important public water supply or loss of significant commercial/ industrial/ agricultural supplies. Adverse: partial loss of the integrity of GWDTE. Beneficial: moderate betterment of groundwater contamination through remediation and/or mitigation and removal of risk to receptors. Beneficial: support to significant improvements in damaged GWDTE.
	Soil Quality	Adverse: permanent, irreversible sealing or loss of one or more soil functions (including downgrading of ALC) over an area between 5ha and 20ha. Beneficial: permanent improvement of one or more soil functions over an area of between 5ha and 20ha.
	Designated Geological Sites	Adverse: partial loss of geological feature/designation, potentially adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements. Beneficial: moderate improvement to geological feature/designation.
Small	Human Health	Contaminant concentrations are below relevant screening criteria (e.g., category 4 screening levels). Significant contamination is unlikely with a low risk to human health. Good practice measures can be used to avoid or reduce risks to human health. Adverse: soil contamination is considered to pose a low risk to potential receptors with one or more contaminant linkages possibly present.

Magnitude of impact	Receptor type	Description of Impact
		Beneficial: slight betterment of ground contamination through remediation and/or mitigation (benefit) and reduction of risk to some or all receptors.
	Surface Water	Adverse: minor effects on water supplies.
	Groundwater	Adverse: minor effects on an aquifer, GWDTEs and abstractions not representing a risk to existing resource use or ecology. Beneficial: slight betterment of groundwater contamination through remediation and/or mitigation (benefit) and reduction of risk to some or all receptors.
	Soil Quality	Adverse: permanent, irreversible sealing or loss of one or more soil functions (including downgrading of ALC) over an area of <5ha, or a temporary, reversible loss of one or more soil functions. Beneficial: permanent improvement of one or more soil functions over an area of <5ha.
	Designated Geological Sites	Adverse: minor measurable change in geological feature/designation attributes, quality or vulnerability. Adverse: minor loss of, or alteration to, one (maybe more) key characteristics, features or elements. Beneficial: minor improvement to geological feature/designation.
Negligible/ no change	Human Health	Contaminant concentrations substantially below levels outlined in relevant screening criteria (e.g., category 4 screening levels). Adverse: soil contamination is considered to pose a very low risk to potential receptors with one or more contaminant linkages unlikely to be present. No requirement for control measures to reduce risks to human health/make land suitable for intended use.
	Surface Water	The proposed project is not expected to have effects on the water environment.
	Groundwater	No measurable impact upon an aquifer and/or groundwater receptors.
	Soil Quality	No discernible loss/reduction of soil function(s) that restrict current or approved future use. No measurable change to quality of soil resources.

Magnitude of impact	Receptor type	Description of Impact
	Designated Geological Sites	Adverse: very minor loss or detrimental alteration to one or more characteristics, features or elements of geological feature/designation. Beneficial: overall integrity of resource not affected. Beneficial: very minor improvement to geological feature/designation.

11.7 Mitigation

11.7.1 The following potential mitigation should be considered through the design and EIA process.

Primary

11.7.2 The Project would, where practicable, be designed to avoid land stability issues and risk of encountering collapsible ground, high sensitivity/value soils and geological receptors, and areas where potential land contamination has been identified.

11.7.3 Mitigation would be identified throughout the design process to ensure that potential impacts are eliminated/reduced, for example through limiting construction footprints, the stripping and sustainable re-use of soils and spillage containment.

Secondary

11.7.4 At this stage, the requirement for specific mitigation measures in respect of Ground Conditions and Land Contamination cannot be meaningfully identified, particularly in relation to impacts from land contamination. Nevertheless, where contamination impacts are identified during ground investigations or construction, bespoke remediation strategies will be developed, as appropriate to the nature and extent of contamination encountered and agreed with the relevant authorities.

Tertiary

11.7.5 The following legislation, industry guidance and good practice will be adhered to (but not limited to) in order to mitigate impacts related to soils, geology and land contamination:

- LCRM[219] process with regards to potential contamination risk assessment and implementation of mitigation if required

- Contaminated Land: Applications in Real Environments (CL:AIRE). Definition of Waste: Development Industry Code of Practice (DoW:CoP)[220]
- Control of Asbestos Regulations 2012: Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition materials: Industry Guidance (CAR-SOIL)[221]
- Construction Code of Practice for the Sustainable Use of Soils on Construction Sites[222]
- Control of Asbestos Regulations (2012)[223]
- Construction (Design and Management) Regulations (2015)[224]

11.7.6 Based on the urban land use in the area of the Project, impacts to the function or quality of soil as a resource or to agricultural land classified as BMV or prime land are not considered likely. Nevertheless, it is likely that topsoil and subsoil would be disturbed during construction, and this will need to be managed in order to protect it from damage and ensure it is available for re-use, either within the Project or elsewhere. Soil management strategies in line with current good practice are likely to be needed where this is the case. Chapter 17 Waste and Materials, presents the scope and methodology for the construction waste assessment of the Project including the management and use of material resources generated on the Project.

11.7.7 A Materials Management Plan (MMP) and a Soil Resource Plan (SRP) will likely be produced in accordance with the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites[225]

11.7.8 A GI and relevant land contamination risk assessments will be completed to inform remedial strategies in accordance with LCRM[226] and an MMP in accordance with the DoW:CoP[227] for reuse of site-won soils.

Operation phase mitigation

11.7.9 Operational impacts related to Ground Conditions and Land Contamination are not anticipated. It is assumed that the majority of effects related to land contamination would likely be controlled by tertiary mitigation, along with remediation of contamination during construction. Standard controls should be in place, such as the use of hardstanding and appropriate drainage/pollution control systems and any industrial processes (such as discharges) would be controlled under an Environmental Permit by the Environment Agency. At this stage, based on the baseline data available, it is not envisaged that remediation techniques other than excavation would be implemented. Therefore, there would be no associated temporal effects or long-term management associated with this as opposed to a capping layer. As such, operational impacts of ground conditions and contaminated land are scoped out of the EIA.

11.7.10 Appropriate working practices, monitoring, controls and emergency responses should be in place to limit the occurrence and impact of the introduction of contamination from spillages and leaks of fuels, lubricants and dosing agents used in operation and maintenance activities.

11.8 Summary of Scope for the EIA

11.8.1 Construction phase impacts to human health, surface water and groundwater from existing and introduced contamination have been scoped in.

11.8.2 No designated geological sites have been identified within the EIA Scoping Boundary, as such damage to geological sites resulting from construction are proposed to be scoped out of the EIA.

11.8.3 No high grade agricultural or best and most versatile (BMV) land has been identified within the EIA Scoping Boundary, and so damage or sterilisation of high grade agricultural land resulting from construction is proposed to be scoped out of the EIA.

11.8.4 Significant contaminated land impacts are not anticipated during the operational phase of the Project. This is because during operation there would be no ongoing risk of potentially disturbing historical contaminants nor any significant changes to the Project that would affect the potential impacts of residual contaminants within the EIA Scoping Boundary, and all relevant mitigation measures, such as removal or capping, would be completed by the end of the construction phase or would have been incorporated into the design of the Project. At the current time, based on the baseline data available, it is not envisaged that remediation techniques other than excavation are likely to be implemented. Therefore, there would be no associated temporal effects or long-term management associated with this remediation technique as opposed to a capping layer, for example.

11.8.5 Operation and maintenance activities could introduce new contamination from spillages and leaks of fuels, lubricants and dosing agents. It is considered that control under an Environmental Permit, appropriate working practices, monitoring, controls and emergency responses should be sufficient to limit these occurrences and their potential impact. As such, operational impacts of ground conditions and contaminated land are proposed to be scoped out of the EIA and not shown in Table 11.10.

11.8.6 Table 11.10 provides a summary of receptors or impact pathways proposed to be scoped in or out of the ES. These are based on the assessment of Likely Significant Effects in section 11.6 and the Assessment Methodology in section 11.6.

Table 11.10 Summary of the Scope for Ground Conditions and Contaminated Land

Local planning authority	Shaft/infrastructure reference	Potential sensitive receptors	Potential impact	Potential effects Scoped In/Out	Comments
LBH, RBR and RBK	All locations	Designated Geological Sites.	Damage to geological sites resulting from construction.	OUT	No sites identified within the EIA Scoping Boundary. (Refer to paragraph 11.4.20)
LBH, RBR and RBK	All locations	Grades 1-3 agricultural land.	Damage or sterilisation of high grade agricultural land resulting from construction.	OUT	No high grade land identified within the EIA Scoping Boundary. (Refer to paragraph 11.4.18)
LBH and RBR	Conveyance route Ham Playing Fields Ham Street Car Park Burnell Avenue reception shaft and connection shaft Northweald Lane – TLT connection shaft	Surface Water	Deterioration of surface water quality within the EIA Scoping Boundary from migration of contamination during construction.	IN	To be assessed further by desk based assessments and the ground investigation.
LBH, RBR and RBK	All locations	Groundwater	Deterioration of groundwater quality within the EIA Scoping Boundary from migration	IN	To be assessed further by desk based

Local planning authority	Shaft/infrastructure reference	Potential sensitive receptors	Potential impact	Potential effects Scoped In/Out	Comments
			of contamination during construction.		assessments and the ground investigation.
LBH, RBR and RBK	All locations	Human Health	Adverse impact to human health from potential contamination encountered during construction.	IN	To be assessed further by desk based assessments and the ground investigation.
LBH, RBR and RBK	All locations	Land and property	Embankment stability, collapsible ground, ground subsidence impacting the Project or causing damage to neighbouring land or property during construction.	OUT	To be assessed further by the ground investigation.

12 Townscape and Visual Amenity

12.1 Introduction

12.1.1 This chapter of the Environmental Impact Assessment (EIA) Scoping Report presents the outcome of the scoping exercise in relation to the likely significant townscape and visual amenity effects of the Project. The Townscape and Visual Impact Assessment (TVIA) will identify and assess the potential effects of the Project during the construction and operational stages on the townscape and visual resource within a defined assessment area (study area discussed in paragraphs 12.4.1 to 12.4.3). The chapter should be read in conjunction with the description of the Project as presented in Chapter 2 The Project.

12.1.2 The assessment of townscape effects will address the effects of change and development on the townscape as a resource (i.e., townscape receptors such as character areas and designated features). The assessment will be primarily concerned with the extent to which the Project would impact the elements that make up the townscape, the aesthetic and perceptual aspects of the townscape and its distinctive character. Townscapes vary considerably in character and quality and constitute a key component of the distinctiveness of any local area.

12.1.3 The assessment of visual effects would address the effects of change and development on the views available to people and their visual amenity (i.e., visual receptors). It would primarily be concerned with how the surroundings of individuals or groups of people may be specifically affected by changes in the nature and character of views as a result of the change or loss of existing elements in the townscape and/or the introduction of new elements.

12.1.4 Although there is some overlap between the consideration of landscape/townscape receptors and ecology receptors, assessment of potential impacts on ecological designations (e.g., Local Nature Reserves (LNR), Site of Special Scientific interests (SSSI), Sites of Importance for Nature Conservation (SINC)) is not covered in this section, and reference should be made to Chapter 9 Terrestrial Ecology. Similarly, although historical designations such as conservation areas and listed buildings are one element of understanding the townscape character, the assessment of potential effects on these specific designations, is covered in Chapter 8 Historic Environment.

12.2 Consultation and Engagement

12.2.1 Non-Statutory Consultation was undertaken from October 2023 to December 2023 to seek feedback about the site options for the Project from a variety of people such as landowners, residents, businesses, local

authorities, and other statutory bodies who might be affected by or interested in the Project. Regarding townscape and visual amenity, potential concerns were raised about the visual effects on local communities, open and green spaces, as well as the impact of light during operation.

12.2.2 On 1 and 15 August 2024, engagement was held with representatives from London Borough of Hounslow (LBH), London Borough of Richmond upon Thames (LBR) and Royal Borough of Kingston Upon Thames (RBK) via video link. The Project team outlined the baseline environment in relation to the townscape and visual amenity, the proposed assessment methodology and an outline of which aspects were proposed to be scoped in and which were proposed to be scoped out.

12.2.3 Baseline documents were referred to, including:

- LBR Urban Design Study [228]
- LBH Urban Context and Character Study[229]
- Royal Kingston, 2014, Kingston, Towards a Sense of Place. A Borough Character Study to Support the Kingston Local Development Framework[230]
- Thames Landscape Strategy[231]
- The All-London Green Grid. Supplementary Planning Guidance[232]

12.2.4 During the meeting questions were raised regarding the choice of viewpoints. Representative of RBK indicated that there may be reciprocal views between boroughs and indicated that this comment would be provided in writing. Representative of LBH indicated that there is a large evidence base in a character design report, produced for Hounslow's Regulation 19 Consultation on the Local Plan. Regard to these points will be considered within this assessment.

12.3 Legislation and Policy Review

12.3.1 Key policy relevant to landscape and visual effects set out in the National Policy Statement (NPS) for Water Resources Infrastructure[233] is as follows:

- Paragraph 4.3.18 seeks to protect ancient woodland, ancient and veteran trees, stating that: '*The Secretary of State should not grant development consent for any development that would result in the loss or deterioration of irreplaceable habitats including ancient woodland and the loss of ancient or veteran trees found outside ancient woodland, unless there are wholly exceptional reasons for the development, and a suitable compensation strategy exists'*
- Paragraph 4.9.2 requires the applicant to undertake an assessment of any likely significant landscape and visual impacts, including cumulative impacts. The assessment should include reference to any landscape character assessment and relevant policies based on these assessments

12.3.2 In addition to the policy set out in the NPS for Water Resources Infrastructure, other legislation, policy, standards and guidance of relevance to landscape is summarised in Table 12.1 below.

Table 12.1 Relevant legislation, policy and guidance

Relevant legislation, policy and guidance
Legislation
Countryside and Rights of Way (CROW) Act 2000
Petersham and Ham Open Spaces Act 1902
National policy
NPS for Water Resources Infrastructure 2023[234]
The National Planning Policy Framework (NPPF) (2023)[235]. It is noted that the NPPF (2024) was under consultation until September 2024
Planning Practice Guidance for the Natural Environment[236]
Planning Practice Guidance for Design[237]
Regional and local policy
The London Plan 2021[238]
The LBH Local Plan 2015 - 2030[239] and the LBH Local Plan 2020 - 2041 (emerging policy)
The LBR Local Plan 2015 – 2018[240] and the LBR 'Pre-Publication' Draft Local Plan (2024)[241]
The RBK Core Strategy 2012[242] and Kingston's Local Plan 2019 - 2041 (emerging policy)[243]
Guidance
The LBR Supplementary Planning Guidance on Conservation Areas[244]

12.4 Existing Environment and Baseline Conditions

Study area

12.4.1 The study area for the purpose of the scoping study, has been informed by consideration of the nature of the development and the extent to which the Project is likely to be visible from the surrounding landscape. The approach taken is in accordance with guidance provided in the Guidelines for Landscape and Visual Impact Assessment 3rd Edition (GLVIA3)[245]. Paragraph 5.2 of GLVIA3 states that '*the assessment area should include the site itself*

and the full extent of the wider landscape around it which the Scheme may influence in a significant manner. This will usually be based on the extent of Landscape Character Areas likely to be significantly affected either directly or indirectly. However, it may also be based on the extent of the area from which the development is potentially visible, defined as the Zone of Theoretical Visibility, or a combination of the two.'

12.4.2 The GLVIA3 advocate a proportionate approach to the TVIA process, with emphasis placed on the potential for significant effects. The likelihood of significant landscape and visual effects diminishes with increasing distance from a scheme. Often at the scoping stage, a bare earth Zone of Theoretical Visibility (ZTV) model may be produced, in order to agree an appropriate study area. However, in this case, due to the densely developed nature of the surroundings, and the predominantly flat topography, it was judged that a bare earth ZTV will not provide a useful basis of understanding the likely visibility. Instead, based upon an understanding of the baseline townscape and visual context (as described in further detail below), and based on professional experience, a 2.5km study area, offset from the EIA Scoping Boundary shown on Figure 12.1, has been identified as the extent of the study area for identifying sensitive receptors.

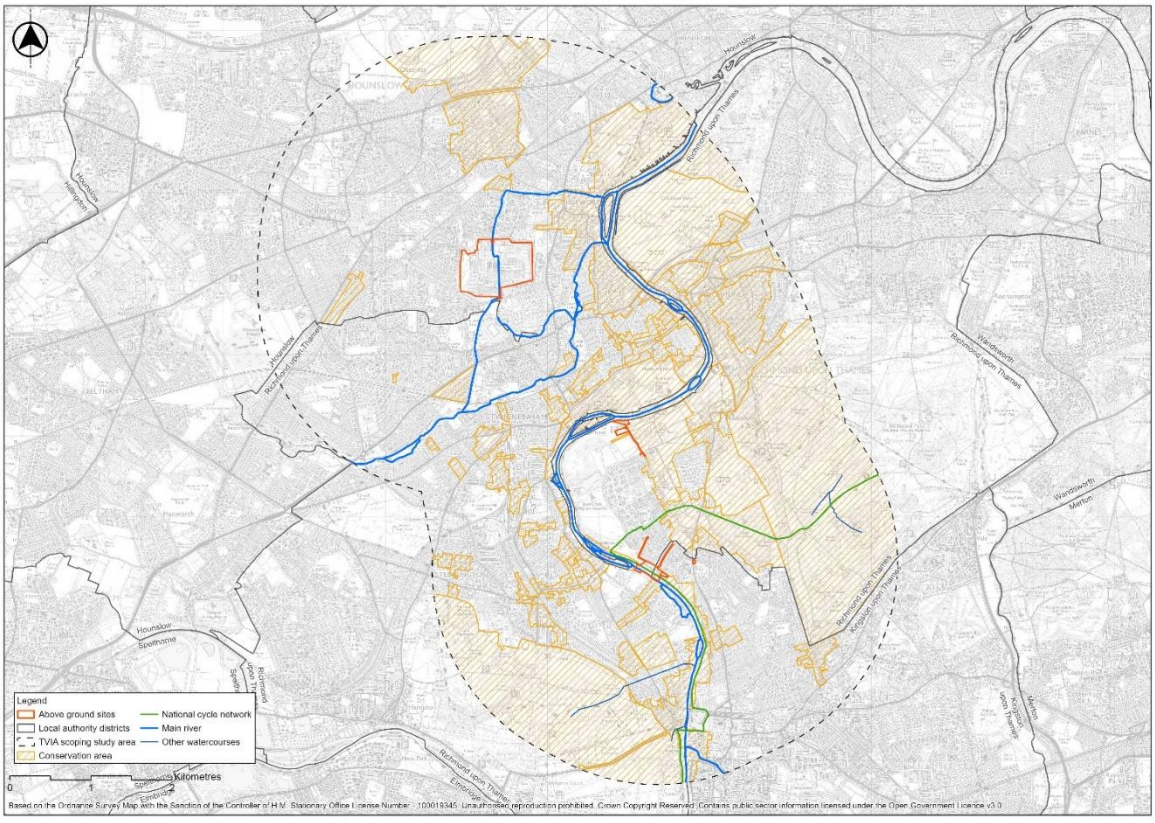


Figure 12.1 Study area and townscape features and designations

12.4.3 While it is expected that beyond 1km there are few townscape and visual receptors that would be sensitive to the type of development proposed, while details of the Project are still being finalised, in light of further assessment and engagement activities through to Development Consent Order (DCO) submission, the study area has been extended to include views from Richmond Hill (as defined by the Petersham and Ham Open Spaces Act, 1902) and the strategic view from King Henry's Mound which is protected through the GLA's London View Management Framework and also by designation as an important view by Richmond's' Local Plan (LP5)[246]. However, it should be noted that while views from King Henry's Mound are identified as a Strategic View in the London View Management Framework, the Project does not fall within the Viewing Corridor to St. Paul's Cathedral.

Baseline sources

12.4.4 The EIA scoping exercise has been undertaken with reference to good practice guidance (primarily Guidelines for Landscape and Visual Impact Assessment, 3rd edition[247] and supporting Technical Guidance Notes from the Landscape Institute[248]), the project description in Chapter 2 The Project and relevant data sources. The principal data sources used to inform the assessment of potential effects, comprises the following:

- Ordnance Survey Mapping at 1:25,000 to understand topography, identify land use, footpaths and cycle paths
- Aerial photography to further understand land use/landscape patterns[249]
- Sustrans Cycle Route maps[250]
- National, regional and local planning policy (as referenced below)
- London View Management Framework Supplementary Planning Guidance[251]
- The All London Green Grid. Supplementary Planning Guidance[252]
- Thames Landscape Strategy[253]
- LBH Urban Context and Character Study[254]
- LBR Urban Design Study[255]
- LBR Local View Supplementary Planning Document[256]
- Kingston, Towards a Sense of Place[257]
- The RBK View Study Report 2018[258]

Baseline conditions

12.4.5 A desk-based review of available data sources has been undertaken to support this EIA Scoping Report, and to identify receptors with the potential to experience significant effects. The findings are summarised, below.

Townscape context and the site

12.4.6 For the purpose of the TVIA, the site is considered to be land within EIA Scoping Boundary for the above ground sites, as shown on Figure 12.1

above and on Figure 2.2, Figure 2.3 and Figure 2.4 in Chapter 2 The Project. Although there are sections of underground tunnel that connect the shafts, all proposed tunnel infrastructure will be underground and not experienced by townscape or visual receptors. Therefore, for the purposes of the TVIA, these underground elements are not considered as development that informs the assessment.

12.4.7 In understanding the local townscape character, reference has been made to the LBH Urban Context and Character Study, LBR Urban Design Study and RBK Urban Context and Character Study (see Figure 12.2), all as referenced in paragraph 12.4.4 above. In addition, the Ham Lands (Ham Street Car Park and Ham Playing Fields), Burnell Avenue, Northweald Lane and Tudor Drive sites, all sit within the townscape covered by the Thames Landscape Strategy. The Thames Landscape Strategy was last updated in 2012, and so the character assessments published by the local planning authorities are more current. However, for context, information from the Thames Landscape Strategy has been reviewed and informed decisions about the scope of the TVIA.

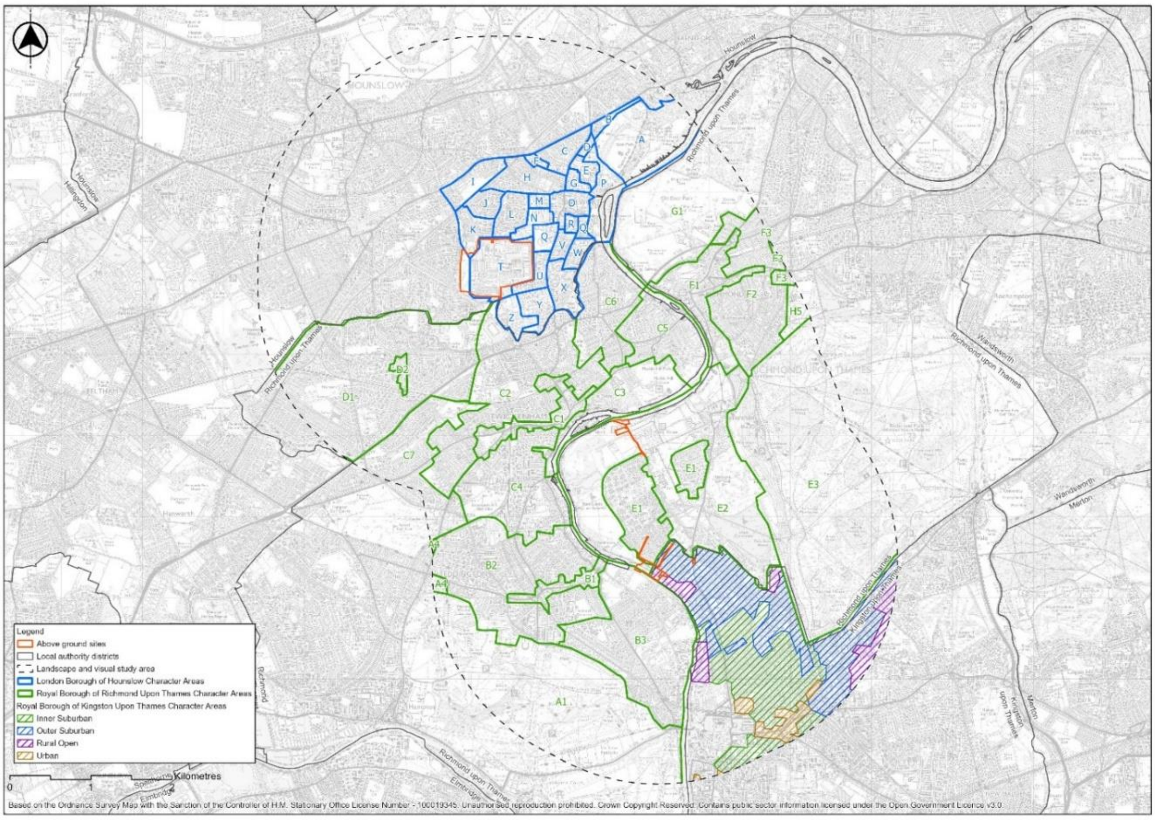


Figure 12.2 Townscape character areas

12.4.8 Review of existing data demonstrates that the land use, landscape/townscape features, designations and townscape character of different parts of the site are variable, as set out in Table 12.2.

Table 12.2 Townscape character, townscape features and townscape designations of the project

Above ground sites	Published townscape character information	Notable townscape features within the site	Townscape designations
Mogden Sewage Treatment Works (STW) site (drive shaft, tertiary treatment plant (TTP), interception shaft and ancillary infrastructure)	The site forms part of LBH, Isleworth – Townscape Character Area (TCA) T Exact from published character area write up: *'Thames Water Mogden Sewage Works, built in the 1930s on former Mogden Farm, covers approximately 50ha and is accessed from Mogden Lane and Oaks Lane. The area contains a number of Art Deco infrastructure buildings, including the prominent 1930s office building with its central tower that ends the vista looking from Mogden Lane. A dense, slightly raised bank of vegetation wraps around the majority of the site's perimeter. The Duke of Northumberland's River passes through the site and offers a pleasant tree lined walk, through an otherwise inaccessible part of Isleworth, although sections of the footpath are in need of improvement.* *Design Quality - Medium* *Sensitivity to change - Medium* *Permanence - High* *Suitability for tall buildings – Unsuitable'*	On the eastern and southern boundaries of Mogden STW site, is an embankment that is planted with mature trees.	A published walking route (variably called Three Rivers Walk/Crane River Walk/Duke's River Walk) runs through the centre of the existing STW. Land to the east, south and west of Mogden STW (including land within the EIA Scoping Boundary) is designated as Metropolitan Open Space (Other) and also by Hounslow as Local Open Space.

Above ground sites	Published townscape character information	Notable townscape features within the site	Townscape designations
Ham Lands sites (intermediate shaft)	The site forms part of LBR TCA E2 - Ham Common and Riverside Extract from the published TCA: *'Ham Common and Riverside encompasses the stretch of riparian landscape following the River Thames from Petersham Common to Teddington Weir, and enveloping Ham and Petersham Residential character area. It includes several conservation areas and historic landscapes.* *A distinctive, semi-rural character and a sense of openness from extensive green spaces and the River Thames. The area includes extensive open spaces, the majority of which are designated Metropolitan Open Land. It includes Petersham Common, Petersham Meadows, Ham Lands and Ham Common Woods Local Nature Reserves, Ham Common, Ham House and Garden and the Old Richmond Golf Club adjacent to Richmond Park.* *A historic townscape of very high quality and consistently strong character, reflected in much of the area being designated as conservation areas including Ham House CA, Petersham CA, Ham Common CA, Parkleys Estate CA, and parts of Richmond Hill CA and Teddington Lock CA. The historic core of Petersham*	The western part of the Ham Playing Fields site is located within 'Ham Lands' which is a playing field and LNR. The Thames Path on the south banks of the river, follows the northern boundary of the Ham Street Car Park site. Mature trees along the southern edge of the Ham Street Car Park. Riverside open spaces, which are of recreational and historical value.	The Thames Path is located along the northern boundary of the proposed Ham Street Car Park site compound. The Ham Lands sites sit within the Ham House Conservation Area (see Chapter 8 Historic Environment). Ham Lands is designated as Metropolitan Open Land.

Above ground sites	Published townscape character information	Notable townscape features within the site	Townscape designations
	village dates to the early medieval period. Grand buildings have varied textures and detailing, such as Beaufort House on Ham Street, reflecting its historic relationship with the estate. High brick boundary walls and narrow, winding avenues are typical features. Buildings range from 2 to 3 storeys. *Contained within the Thames floodplain, the area consists of flat, low-lying topography except for the steep, eastward rise of Petersham Common where it climbs Richmond Hill scarp slope. Richmond Hill provides a green backdrop to views eastwards along the Thames and over Petersham Meadow.* *Remarkable views and vistas along the River Thames. The area is within the view from Richmond Hill, as painted by Turner, and is safeguarded by the 1902 Richmond Petersham and Ham Open Spaces Act. Views towards Richmond Hill and the Royal Star and Garter often include the grazing cattle of Petersham Meadows, which enhance the historic, rural feeling, providing a sense of how this landscape might have used to look.* *Ham House and the surrounding estate was built in the early 17th century and is integral to the appearance and layout of the area, with prominent avenues forming the basis for the corridor of green spaces to Ham Common.*		

Above ground sites	Published townscape character information	Notable townscape features within the site	Townscape designations
	Ham Common forms the focal point of the conservation area and is a setting for local sport and recreation such as cricket and football. Several brick mansions overlook the Common, forming a grand frontage. *Parkley's Estate CA stands in contrast to much of the area, as a highly influential 1950s development of flats and detached houses in a lush, green setting.* *Poor public transport accessibility level (PTAL). There are some bus links to Richmond and Kingston but few main roads and no nearby train stations. However, the area is intersected by several major walking routes and is readily accessible open space for residents of Ham and Petersham'*		

Above ground sites	Published townscape character information	Notable townscape features within the site	Townscape designations
Burnell Avenue and Northweald Lane (intake, outfall, reception shaft, connection shaft, Thames Lee Tunnel (TLT) connection shaft and temporary works areas)	The site forms part of LBR TCA E2 - Ham Common and Riverside (see above). The site also forms part of the London Borough of Kingston TCA 'Tudor' – Sub Area 3 – YMCA Riverside Lands. Extract from the published TCA: '*This is a valuable, public, open space. An area which since its humble origins in a planning agreement for the housing beyond the northern boundary, developed around the former Hawker sport and social club, has grown through popularity and good upkeep into a treasured public space and a vitally important part of the setting of Kingston's prestigious riverside.'*		Sustrans Route 4 is a long-distance cycle path that follows the banks of the River Thames, through this part of the site. A number of Public Rights of Way, including the Thames Path, cross the sites. The outfall site lies within an area of Metropolitan Open Land (MOL) (Ham Lands). The intake site is adjacent to the River Thames, within the Royal Park Gate Open Space, and within the Kingston upon Thames Northern Riverside Conservation Area. Locally, the site is allocated as part of the River Thames Green Chain, Riverside North Conservation Area, the Thameside Area of Special Strategic Character. The townscape surrounding this part of the site forms part of a locally designated view from Teddington Lock.

Above ground sites	Published townscape character information	Notable townscape features within the site	Townscape designations
Tudor Drive	The site forms part of the London Borough of Kingston TCA 'Tudor' – sub area 9 St.George's Industrial Estate Extract from the published TCA: St.George's Industrial Estate A neutral collection of 2-storey sheds on a private estate road. Street parking feels exposed especially when the car-park behind the development is largely empty (most parking spaces close to the units appear taken by staff, hence customers and deliveries park in road). The Nikon Building fronting Richmond Road is a characterless but neutral, 3-storey, dark glass building.		There are no identified designations within the St.George's Industrial Estate

Townscape of the surrounding study area

12.4.9 Much like the townscape of the site, the wider 2.5km study area is a varied mosaic of residential, industrial, recreational and infrastructure land uses. The age, layout, architectural style, height and materials of built form is variable, but a combination of the density and layout of built form, along with the generally flat and low-lying nature of the topography, means that views are typically short range and contained, and surrounding townscapes features do not tend to influence localised townscape character. Exceptions exist where open spaces (particularly those along the River Thames and River Crane, which by virtue of the rivers themselves, have a more open aspect) provide the opportunity for more open and expansive views, which is an important element of the local character.

Visual context

12.4.10 The visual context of the 2.5km study area is variable. At a high level the study area can be split into three areas of distinct visual context, as described below.

12.4.11 North of the River Thames where Mogden STW is located, development is fairly dense. Combined with the fairly flat topography, views are typically short range and channelled by built form. Views are characterised by a mixture of land uses and architectural styles, viewed at close range. Where there are local parks or recreation grounds e.g. Moormead Park, Redlees Park and Bandy Recreation Ground, a more open aspect is often available, although the combined effect of the flat topography and mature trees around the perimeter of the space, also restrict long range or expansive views. However, views across recreation grounds are notable as a key component of what makes the character of the area distinct, and the simple composition of landscape elements results in the sense of being in an attractive, high-quality townscape.

12.4.12 South of the River Thames - there is an expansive area of Metropolitan Open Land at Ham Lands. This wide-open space contains minimal built form, and the landscape features of Ham Lands and the River Thames, are the focus of the view. The Thames Path, Sustrans Route 4, Teddington Lock, other footpaths and frequent recreation grounds, allotments and play areas, provide access for many people to enjoy the area, meaning that there are many potential visual receptors of any change to the view.

12.4.13 Immediately north of the River Thames, along the northern riverbanks, there are occasional smaller scale parks and open spaces, where there are opportunities to experience views across the river to the south, and across Ham Lands e.g., Radnor Gardens, Orleans Gardens. However, the Thames Path along the northern banks often diverts away from the riverbanks, into surrounding residential neighbourhoods. The value of the views available

from the open spaces along the River Thames is recognised by the locally important views designated by LBR and RBK, in their Local Plans and supporting View Management Supplementary Planning Document (SPD). Where there is potential for the Project (or its construction) to be visible from the locally designated view, the view will form part of the viewpoint assessment included in the TVIA.

12.5 Sensitive Receptors and Potential Environmental Effects

Sensitive Receptors

Townscape

12.5.1 Across the three local authorities within which above ground features of the project are located, there are many townscape character areas (TCA)/townscape types, as identified by the published townscape character assessments. The distinction between character areas is often on the basis of a change in architectural style or period of development. Consideration of what makes each special and distinct, and the importance of the surrounding context to the character, has been reviewed. It has been concluded that the majority are self-contained and, given the urban context and the Mogden embankment, the introduction of cranes on the skyline, or the introduction of new built form (e.g., at Mogden STW) would either not be perceptible or would not alter the overarching townscape character.

12.5.2 On this basis, the majority of the published townscape character areas that sit outside the EIA Scoping Boundary, but within the surrounding study area, are scoped out of the TVIA. However, an exception has been made for character areas that relate to the open spaces along the River Thames (see Table 12.11 for a list of proposed receptors scoped into the TVIA). The banks of the River Thames are characterised by frequent public open spaces with a distinct character. The open aspect of the views across undeveloped areas of public open space is a key characteristic of this area of landscape/townscape. For example, the character area write up for TCA E2 - Ham Common and Riverside, within LBR, notes the ‘distinctive, semi-rural character and a sense of openness from extensive green spaces and the River Thames’ and the ‘Remarkable views and vistas along the River Thames’.

Visual Context

12.5.3 An understanding of the existing visual context has informed decisions about the visual receptors to be scoped into the TVIA and the location of viewpoints which are to be used to support the assessment of visual effects. Details of the viewpoint locations, and the type of visual representation

proposed, is set out in Table 12.7. Visual receptors scoped into the TVIA are listed in section 12.8 and Figure 12.3.

12.5.4 As the Project design and construction methodology evolves, the exact viewpoints to be included may change, but based upon current design information, it is proposed to include the following in the viewpoint assessment of the TVIA:

12.5.5 LBR Designated Views

- B1.2 – Teddington Lock Footbridge
- C3.1- South Radnor Gardens
- C3.3 – Twickenham Riverside East
- C3.5 - Great River Avenue, Star and Garter
- E1.1 – Ham House, River Thames
- E3.2: Petersham Park
- F1.1 Richmond Terrace, Richmond Hill

12.5.6 RBK Designated Views

- 108 Views across the River Thames outside the Hawker Centre YMCA near Lower Ham
- Petersham and Ham Open Spaces Act (1902) which protects the foreground views experienced from Richmond Hill, to the south and west

12.5.7 To the south of the River Thames, but to the east of Ham Lands, land rises steeply to Richmond Hill and The Mound/Richmond Park. Although elevations are not very high (the Mound being a localised high point of 56 metres AOD), in contrast to the flat and low-lying Thames floodplain, the landform is prominent and allows for longer range views. The views available from the higher ground, often where they coincide with open space/parkland, are also recognised by designation within the Local Plans. These views will be considered in the assessment.

Potential Environmental Effects

Construction activities

12.5.8 During construction at the Mogden STW site potential landscape and visual effects associated with TTP construction activities along with shaft and tunnel construction within the Eastern and Western Work Areas will include:

- Vegetation clearance, earthworks and soil preparation to prepare for construction activities
- Presence and movement of plant, machinery and construction traffic within and around the site
- Presence of tall plant and machinery (including cranes) on the skyline
- Establishment of construction compound(s) and welfare facilities

- Presence of hoarding/safety fencing around the boundary of construction areas
- Presence of lighting to light construction activities after dark
- Formation of landform, drainage and soft landscaping activities
- Construction of temporary access routes will be required at Mogden STW

Ham Lands

12.5.9 The construction compound will be located within the EIA Scoping Boundary set for the above ground sites, although, its exact size and location within the boundary will be finalised through further design and assessment work. Construction of the shaft will require vegetation removal and earthworks.

12.5.10 At the shaft site, temporary equipment will be stored and used. This may include acoustic covers to dampen sounds around generators, flood lights for work in evening times and construction equipment such as site cabins, crawler cranes, construction waste skips etc. No nighttime working is anticipated at Ham Lands, but this will be considered in the assessment if it becomes likely.

12.5.11 The principal elements which have the potential to result in landscape and visual effects at the construction stage, for this site include:

- Vegetation clearance, earthworks and soil preparation to prepare for construction activities
- Presence and movement of plant, machinery and construction traffic within and around the site
- Presence of tall plant and machinery (including cranes if used) on the skyline
- Establishment of construction compound(s) and welfare facilities
- Presence of hoarding/safety fencing around the boundary of construction areas
- Presence of lighting to light construction activities after dark, although no nighttime working at Ham Lands is likely. If it is planned, then it will be considered in the assessment
- Formation of drainage and soft landscaping activities
- Construction of temporary access route to the shaft site

12.5.12 Foreshortening of views across areas of public open space, and introduction of uncharacteristic features to locally designated views.

Outfall, intake and Thames Lee Tunnel connection

12.5.13 The principal elements which have the potential to result in townscape and visual effects at the construction stage, for these sites are set out below.

12.5.14 As with the shaft site at Ham Lands the construction compounds will be located within the EIA Scoping Boundary set for the above ground sites,

although, their exact size and location within the boundary will be finalised through further design and assessment work.

12.5.15 At the shaft sites, temporary equipment will be stored and used. This is likely to include acoustic covers to dampen sounds around generators, flood lights for work in evening times and construction equipment such as site cabins, crawler cranes, construction waste skips etc. It is unlikely that there will be nighttime working at the Burnell Avenue, Northweald Lane or Tudor Drive sites, if it is then it will be considered in the assessment.

12.5.16 Burnell Avenue and Northweald Lane

- Vegetation clearance, earthworks and soil preparation to prepare for construction activities
- Presence and movement of plant, machinery and construction traffic within and around the site
- Presence of tall plant and machinery (including cranes if used) on the skyline
- Establishment of construction compound(s) and welfare facilities
- Establishment of cofferdam to enable construction of the intake and outfall structures
- Presence of hoarding/safety fencing around the boundary of construction areas
- Presence of lighting to light construction activities after dark, although no nighttime working at the Burnell Avenue or Northweald Lane sites currently proposed. If lighting becomes necessary, it will be considered in the assessment
- Formation of landform, drainage and soft landscaping activities
- Construction of temporary access routes at shaft sites
- Foreshortening of views across areas of public open space, and introduction of uncharacteristic features to locally designated views

12.5.17 Tudor Drive

- Vegetation clearance, earthworks and soil preparation to prepare for construction activities
- Presence and movement of plant, machinery and construction traffic within and around the site
- Presence of tall plant and machinery (including cranes if used) on the skyline
- Establishment of construction compound(s) and welfare facilities
- Presence of hoarding/safety fencing around the boundary of construction areas
- Presence of lighting to light construction activities after dark, although no nighttime working at the Tudor Drive site
- Construction of temporary access route onto the Tudor Road site

Operational activities

12.5.18 The operation of the Project will likely include the following elements:

- Changes to townscape character: townscape character may be affected through the incremental effect on characteristic elements, townscape patterns and qualities (including perceptual characteristics) and the cumulative addition of new features, the magnitude of which is sufficient to alter the overall landscape character of a particular area. New above ground infrastructure that may affect the townscape character will include:
- New TTP and final effluent pumping station at Mogden STW, consisting of a range of infrastructure set both on a platform and at ground level in the Eastern Work Area. The maximum height of the TTP apparatus is estimated to be 15m above ground level within the Eastern Work Area. The exact height of the infrastructure at Mogden is subject to further hydraulic analysis, pilot plant testing and detailed design
- Presence of permanent access hatches at shaft sites, and telemetry kiosks at some sites
- New discharge structure upstream of Teddington weir
- New intake structure, consisting of reinforced concrete and fish and eel screens, pumping station and associated development at Teddington upstream of Teddington weir and the proposed discharge structure.
- Any security lighting to sites and structures
- Potential changes to landscape qualities: degradation or erosion of townscape elements and patterns and perceptual characteristics as a result of loss of vegetation. On the basis that the Project landscape mitigation and planting will be designed and implemented, this impact should be mitigated
- Change to views as a result of introduced infrastructure. This could include foreshortening of views and introduction of uncharacteristic infrastructures

12.6 Assessment Methodology

12.6.1 The documents below establish an outline of the methodology that we propose to use to assess the townscape and visual effects of the Project. The proposed methodology has been developed in accordance with the following documents:

- Guidelines for Landscape and Visual Impact Assessment [259]
- Visual Representation of Development Proposals Technical Guidance Note[260]

12.6.2 Published landscape/townscape character assessments (referenced above), will be reviewed during surveys to ensure they are representative of the study area and take account of development influencing change and, if required, supplementary descriptions will be provided and/or additional townscape character areas be identified. The documents below will be reviewed to inform further character assessment, if required:

- Technical Information Note 05/2012 on Townscape Character Assessment[261]
- An Approach to Landscape Character Assessment [262]

12.6.3 The proposed assessment will be proportionate, focusing on likely significant adverse effects within the study area. Effects on receptors that are not considered likely to be significantly affected will be summarised concisely but will not be set out in detail.

12.6.4 It is proposed to base the assessment of landscape effects within the study area on published Townscape/Landscape Character Areas. The assessment of impacts on landscape components, such as trees and woodland, and perceptual and aesthetic aspects will be considered within the assessment of impacts on landscape/townscape character. The assessment of impacts on historic environment features in the study area will be addressed in Chapter 8 Historic Environment.

12.6.5 It is proposed to base the assessment of visual effects on a selection of representative viewpoints representing different receptor groups within the study area. Representative viewpoints have been selected following a review of the topography, land use and the location of designated views within relevant Local Plans. The viewpoint locations that have been selected will represent the likely visual change from a range of receptor types and view locations.

Townscape effects

12.6.6 Landscape (and townscape) effects are defined by the Landscape Institute in GLVIA 3, paragraphs 5.1 and 5.2 as follows:

'*An assessment of landscape effects deals with the effects of change and development on landscape as a resource. The concern ... is with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character. ... The area of landscape that should be covered in assessing landscape effects should include the site itself and the full extent of the wider landscape around it which the Project may influence in a significant manner*.'

12.6.7 Townscape effects are defined as changes to townscape elements, characteristics, character and qualities of the landscape as a result of development. The potential townscape effects that will occur during the construction and operational periods, may therefore include, the following:

- Changes to townscape elements: the addition of new elements or the removal of existing elements such as vegetation and buildings and other characteristic elements of the existing local townscape
- Changes to townscape qualities: degradation or erosion of townscape elements and patterns and perceptual characteristics, particularly those that form key characteristic elements of defined townscape character types or areas or contribute to the townscape value
- Changes to townscape character: townscape character may be affected through the incremental effect on characteristic elements, townscape patterns and qualities (including perceptual characteristics) and the cumulative addition of new features, the magnitude of which is sufficient to alter the overall townscape character of a particular area

12.6.8 The type of effect is also considered and may be direct or indirect, temporary or permanent (reversible) and positive, neutral or negative. Development may have a direct (physical) effect on the townscape as well as an indirect effect which will be perceived from the wider landscape outside the immediate site area and its associated townscape character.

Evaluating landscape sensitivity to change

12.6.9 The sensitivity of a townscape receptor e.g., a Landscape (or Townscape) Character Area, to a particular scheme is determined by the susceptibility of that townscape receptor and its value. The methodology describes townscape sensitivity as high, medium or low and is assessed by considering the landscape receptor's townscape value and townscape capacity or susceptibility to the changes identified as the result of a particular scheme.

Landscape value

12.6.10 GLVIA 3 defines landscape (and townscape) value as:

"The relative value that is attached to different landscapes by society"

12.6.11 A consistent approach will be applied to determining the townscape value of the individual townscape character receptors considered in the townscape assessment (see: Table 12.3). This utilises a range of factors to help understand the value of each townscape receptor, as follows:

- Landscape and townscape designations: whether an area of townscape is recognised by statute (i.e., National Parks), is a heritage coast, a locally designated townscape or is undesignated
- Landscape quality/condition: a measure of the physical state of the landscape (i.e. the intactness of the landscape and the condition of individual elements)

- Rarity: the presence of rare elements or features in the townscape or the presence of a rare townscape character type
- Conservation interests: the presence of features of wildlife or historical and cultural interest which add value to the townscape
- Recreational value: evidence that the townscape is valued for recreational activity where experience of the townscape is important
- Perceptual aspects: a townscape may be valued for its perceptual qualities, notably tranquillity
- Associations: some townscape are associated with particular people, such as artists or writers, or events in history

Table 12.3 Assessing value

Landscape value criteria	Landscape value category		
	High	Medium	Low
Designations:	Internationally or nationally designated townscape.	Regional or locally designated townscape.	Non-designated or 'ordinary' townscape and townscape features.
Townscape quality, condition and intactness:	A townscape /features recognised to be of high townscape quality and in excellent or good condition with a 'strong' intact/unified and distinctive character. Constant/mature landscape with strong time depth. Management plans aim for conservation.	A townscape /features that are of a reasonable or medium quality and condition with an intact and recognisable character. Constant or improving state. Management plans aim for conservation and enhancement.	A townscape /features that are in a poor condition with a fragmented or indistinct townscape character. The townscape may be in a declining state. Management plans aim for enhancement, restoration, or regeneration.
Scenic quality:	A townscape of high aesthetic appeal supported by recognised tourist/visitor literature.	A townscape of moderate or 'ordinary' aesthetic appeal. There may be some minor	A townscape of limited or no aesthetic appeal with many or large-scale detracting features, may by

Landscape value criteria	Landscape value category		
	High	Medium	Low
	There are few or no detracting features.	detracting features.	abandoned or partially derelict.
Rarity and representativeness:	A townscape or features that are rare and valued in a national or regional context that is supported by designation.	A townscape or features that are uncommon but, not particularly valued or supported through designation.	A townscape or features that are common and not rare.
Conservation interest and associations	A townscape with rich and diverse cultural, historic or nature conservation value and recognised literary or artistic associations.	A townscape with some cultural or nature conservation features and interest.	A townscape with few or no cultural or nature conservation features and interest.
Recreation value	High recreational /tourist value indicated through land use (parks/sports facilities etc.) and the density/hierarchy of recreational routes.	A townscape of moderate recreational value, as indicated by land use and density/hierarchy of recreational routes.	A townscape of limited recreational value, where an appreciation of the landscape has a limited contribution to the public's recreational experience.
Perceptual aspects	It is judged that this is a landscape/townscape with high levels of tranquillity.	Localised areas of tranquillity as a result of a combination of the following characteristics: low levels of built form, minimal light levels, low levels of traffic noise allowing for sounds of nature (e.g. birdsong) to be experienced.	Developed landscapes which are the antithesis of tranquillity 'wildness' or naturalness. Light intrusion occurs.

Value of landscape elements

12.6.12 In line with paragraphs 5.30 and 5.33 of GLVIA 3 the value of townscape elements have been considered under three criteria as follows:

- Rarity: The presence of rare elements or features in the townscape often (although not always) supported through designation
- Condition: a measure of the physical state of the townscape element or feature
- Role: the contribution the landscape element makes to the visual amenity and scenic quality, as well as the landscape character at a county or local level (reflected as key characteristics within a LCA)

12.6.13 It is the combination of the three criteria listed above that leads to the judgement of an overall townscape value which may be either Low, Medium or High.

Landscape susceptibility to change

12.6.14 GLVIA 3 defines landscape (and townscape) susceptibility to change as follows:

"*This means the ability of the landscape receptor to accommodate the proposed development without undue consequences for the maintenance of the baseline situation…*" (LI and IEMA, 2013).

12.6.15 GLVIA 3 also emphasises that susceptibility to change is dependent on the types of development proposed. Paragraph 5.42 states:

"*Some of these existing assessments may deal with what has been called 'intrinsic' or 'inherent' sensitivity, without reference to a specific type of development. These cannot reliably inform assessment of the susceptibility to change since they are carried out without reference to any particular type of development and therefore do not relate to the specific development proposed. Since landscape effects in LVIA are particular to both the specific landscape in question and the specific nature of the development, the assessment of susceptibility must be tailored to the project."* (LI and IEMA, 2013).

12.6.16 Table 12.4 provides further guidance and examples of susceptibility, which considers the capacity or ability of the receptor, by virtue of its particular physical, visual or perceptual characteristics to accommodate the Project without undue consequences for the maintenance of the baseline situation and/or the achievement of planning policies and strategies. Generally, townscapes with the highest susceptibility to the proposed change will have the least capacity to accommodate that proposed development. Conversely, townscapes with the lowest susceptibility to the proposed change are likely to have the greatest capacity to accommodate the proposed development.

Table 12.4 Assessing susceptibility to a proposed development

Townscape susceptibility criteria	High	Medium	Low
Examples of physical elements/ characteristics	Highly valued elements or combinations of characteristics such as of small-scale townscapes with strong topographical variation or distinctive landform and complex patterns, which are essentially intact and susceptible to development.	Elements or combinations of characteristics such as medium to large scale townscapes with more open, simple landform and patterns with some capacity for development.	Common/indistinct elements or combinations of characteristics such as large-scale and simple/uniform townscapes, with an absence of topographical variety/featureless/flat landform where similar development is already part of the baseline character and there is capacity for development.
Examples of visual characteristics	Susceptibility to alteration of regionally/locally valued or distinctive skylines, views, vistas and skylines with historic landmarks. Open and exposed landscapes with a strong visual relationship with surrounding townscape /setting and limited visual intrusion.	A partially enclosed townscape offering some visual containment and filtering of views and moderate levels of intervisibility with visual landmarks and surrounding landscapes. A landscape where light intrusion and some movement and change are already present.	A heavily enclosed townscape which contains or strongly filters views with a corresponding limited visual relationship with surrounding townscape. A townscape with an absence of visual landmarks and/or where movement and visual intrusion is already present.
Examples of perceptual characteristics	Perceptions of tranquillity, remoteness or naturalness, with a strong sense of time depth and/or related special qualities and low levels of light intrusion that will be susceptible to development.	Perceptions of moderate tranquillity, remoteness or naturalness, presence of some light intrusion and some visual or audible signs of existing built development/infrastructure giving rise to a townscape with some development capacity.	Landscapes lacking in tranquillity and/or remoteness, which are subject to land use change and high degrees of light intrusion and visual or audible signs of existing built development/ infrastructure with development capacity.

Susceptibility of landscape elements

12.6.17 The susceptibility of townscape elements is approached with reference to whether these elements can be 'replaced' as described in paragraph 5.30 of GLVIA 3. By way of an example one may consider that a stone wall can be re-built relatively easily, in contrast a 500-year-old oak tree cannot be replaced without a similar growth period. The concept of 'replacement' is not a reflection of what might or might not happen as part of the development, rather it is a measure of susceptibility to change. Townscape elements that are difficult to replace or cannot be replaced are likely to be of higher susceptibility than those which can be easily replaced.

Overall landscape sensitivity

12.6.18 The manner in which the value and susceptibility are combined to determine townscape sensitivity is a matter for informed professional judgement and the following matrix shown in Table 12.5. Table 12.5 has been used as a guide to assist this process. In terms of townscape value, national and international townscape designations are generally accorded the highest assessment value.

Table 12.5 Overall townscape sensitivity

Overall townscape sensitivity Susceptibility		High	Medium	Low
Value	High	High	High	Medium
	Medium	High	Medium	Low
	Low	High	Low	Low

Magnitude of townscape change

12.6.19 The magnitude of townscape change or degree of change resulting from the proposed development is described as large, medium, small or very small, in accordance with GLVIA 3 paragraph 3.27 use of 'word scales'. In those instances where, due to mitigation, there would be no magnitude of townscape change, then this justification is also recorded in the townscape assessment. The magnitude of townscape change is described by reference to its size and scale, geographical extent and duration/reversibility in accordance with GLVIA 3, paragraph 5.48-52 that can be summarised as follows.

- Size or scale: The size or scale of townscape change is described via a simple word scale to describe the extent or proportion of loss or addition of landscape elements, the degree to which the perceptual characteristics of the townscape may be altered and whether the effect changes the key characteristics, critical to its distinctive character overall

- Geographical extent: The geographical extent of the effect is distinct from the size and scale of effect. There may for example be a medium loss of townscape elements affecting a large geographical area, or a high-level addition of a proposed development affecting a very localised area, both resulting in a high magnitude of townscape change. The geographical extent is described at a site level within the development site boundary, within the immediate setting of the site, at the scale of the townscape character type or area assessed or on a larger scale, affecting several townscape character types or areas
- Duration and reversibility: In accordance with GLVIA 3 this is a separate, but linked consideration and the duration of an effect may be described as temporary (short term 0-5 years, medium term 5-10 years or long term 10-20 years) or permanent. The Project may also be considered in terms of whether the effects are reversible

12.6.20 Examples and further guidance on the evaluation of the magnitude of landscape change are described in Table 12.6.

Table 12.6 Magnitude of townscape change

Magnitude of change	Key determining criteria
Large	A large-scale change that may include the loss of key townscape elements/characteristics or the addition of new uncharacteristic features or elements that would alter the perceptual characteristics of the townscape. The size or scale of townscape change could create new townscape characteristics and may change the overall distinctive townscape quality and character, typically, but not always affecting a larger geographical extent.
Medium	A medium scale change that may include the loss of some key townscape characteristics or elements, or the addition of some new uncharacteristic features or elements that could alter the perceptual characteristics of the townscape. The size or scale of townscape change could create new landscape characteristics and may lead to a partial change in townscape character, typically, but not always affecting a more localised geographical extent.
Small	A small-scale change that may include the loss of some townscape characteristics or elements of limited characterising influence, or the addition of some new features or elements of limited characterising influence.

Magnitude of change	Key determining criteria
	There may be a small partial change in townscape character, typically, but not always affecting a localised geographical extent.
Very Small	A very small-scale change that may include the loss or addition of some townscape elements of limited characterising influence. The landscape characteristics and character would be unaffected.

12.6.21 The assessment also identifies areas where no townscape change is predicted. In these instances, 'no change' is inserted into the magnitude of change column of the assessment tables and the resulting level of effect identified as 'None'. This commonly occurs where no intervisibility (presence of a line of sight between two locations) or other perceptual effects pathway exists between the townscape receptor and the Project.

Types of Townscape Effect

12.6.22 In accordance with the relevant EIA Regulations the level of townscape effect is also described in terms of:

- Whether the effect would be permanent or temporary (in relation to temporary effects the duration of the effect will be important)
- Whether the effect would be direct or indirect (where direct effects are associated with loss or alteration of individual landscape elements or changes to the physical fabric of a townscape character unit and where indirect effects are associated with changes to surrounding townscape character via a visual or other perceptual effects pathway)
- Whether the effect is judged to be positive (beneficial), neutral or negative (adverse)

12.6.23 The factors influencing judgements of whether effects are positive, neutral or negative and a consideration of cumulative effects are provided below.

12.6.24 In describing the level of townscape effect, the assessment text clearly and transparently sets out the professional judgements that have been made in determining sensitivity and how the value and susceptibility of the receptor has been assessed; and in determining magnitude and how the size and scale, geographical extent and duration of the effect has been considered.

Visual effects

12.6.25 Visual effects are concerned wholly with the effect of the project on views, and visual amenity and are defined by the Landscape Institute in GLVIA 3, paragraph 9.1 as follows:

"An assessment of visual effects deals with the effects of change and development on views available to people and their visual amenity. The concern ... is with assessing how the surroundings of individuals or groups of

people may be specifically affected by changes in the context and character of views."

12.6.26 Visual effects are identified for different receptors (people) who will experience the view at their place of residence, within their community, during recreational activities, at work, or when travelling through an area.

12.6.27 The level of visual effect (and whether this is significant) is determined through consideration of the 'sensitivity' of each visual receptor (or range of sensitivities for receptor groups) and the 'magnitude of change' that would be brought about by the construction and operation of the proposed development. Visual assessment unavoidably involves a combination of both quantitative and subjective assessment and wherever possible a consensus of professional opinion is sought through consultation and internal peer review.

Viewpoint assessment

12.6.28 For the purpose of this TVIA, it is proposed that the visual assessment will be supported by a viewpoint assessment. Eight viewpoints are proposed, as listed below. They have been chosen based upon a review of the baseline topography, land use and designated local views. The viewpoints have been selected to assess the level of change experienced by sensitive visual receptors. Based on the current project description and construction methodology, it is judged that there are sensitive visual receptors that would experience change during both the construction and operational phase. Change experienced during the construction phase will result from the construction of infrastructure at Mogden STW and at the sites of the intake/outfall structure, and also along the proposed conveyance route, at the shaft locations. However, change at the shaft locations will be temporary, and will be experienced for relatively short periods of time. At this point it is considered unlikely that construction at the shaft sites will result in any significant effects being experienced by visual receptors, but while there is still uncertainty around the exact location of shaft sites within the compound areas identified, the construction methods and the length of the construction period, it is proposed to include viewpoints in the TVIA, to assess the effect experienced.

12.6.29 Given the difficulties of accurately capturing construction activity in photomontages, it is proposed that viewpoints which are included to assess construction stage change only, (associated with the shaft locations) are represented as Type 1 visuals (e.g. annotated photography, as defined by LI Technical Guidance Note TGN06/19). Table 12.7 and Figure 12.3 sets out the viewpoint locations proposed and the type of visual proposed.

Figure 12.3 Viewpoint locations

12.6.30 Type 4 visuals will be produced for year of opening (Yr1) and Future Year (Yr15)

12.6.31 Both the Type 1 and Type 4 visuals will be produced in accordance with the methodology proposed by The Landscape Institute in their technical guidance

Table 12.7 Proposed viewpoints and visual representation

Viewpoint reference	Viewpoint location description	Change to the view that will be captured	Type of visual representation (either Type 1 or Type 4, as defined by LI TGN 06/19)
VP1	Reedlees Park, exact location TBC	Construction and operation of the TTP, associated infrastructure and inception shaft site	Type 4
VP2	From LBR designated view B1.2 –	Construction and operational phase of	Type 4

Viewpoint reference	Viewpoint location description	Change to the view that will be captured	Type of visual representation (either Type 1 or Type 4, as defined by LI TGN 06/19)
	Teddington Lock Footbridge	outfall, intake and connection shaft	
VP3	From LBR designated view C3.1- South Radnor Gardens	Construction of intermediate shaft at Ham Lands	Type 1
VP4	From LBR designated view C3.3 3 – Twickenham Riverside East	Construction of intermediate shaft at Ham Lands	Type 1
VP5	From LBR designated view C3.5 Great River Avenue, Star and Garter	Construction of intermediate shaft at Ham Lands	Type 1
VP6	From LBR designated view E1.1 – Ham House, River Thames	Construction of intermediate Shaft at Ham Lands	Type 1
VP7	From LBR designated view E3.2 Petersham Park	Construction of intermediate shaft at Ham Lands	Type 1
VP8	From RBK designated view 108 Views across the River Thames outside the Hawker Centre YMCA near Lower Ham.	Construction and operational phase of outfall, intake and shaft sites at Burnell Avenue.	Type 4

Evaluating visual sensitivity to change

12.6.32 In accordance with paragraphs 6.31-6.37 of GLVIA 3, the sensitivity of visual receptors takes account of the susceptibility of the receptor to visual change and the value of the baseline view available to them. The sensitivity of visual receptors is described as high, medium or low.

12.6.33 The main factors influencing the susceptibility of a visual receptor to change are the occupation or activity of the receptor (people) at particular locations and the extent to which their attention or interest may therefore be focused

on the available view. The visual receptors most susceptible to change are likely to include:

- People at their place of residence
- People engaged in outdoor recreation whose attention or interest is likely to be focussed on the landscape and on particular views
- Visitors to heritage assets or other attractions where views of the surroundings are likely to make an important contribution to their experience
- People in their community where views contribute to their experience (e.g., users of public open spaces)

12.6.34 People using the transport network are usually considered to be moderately susceptible to change unless travelling on recognised scenic routes. Visual receptors likely to be less susceptible to change include:

- People engaged in outdoor recreation that does not depend upon appreciation of views
- People at their place of work where views are not an important contributor to the quality of working life

12.6.35 The factors influencing judgements regarding the value attached to views by receptors include:

- Any recognition of the value attached to a particular view in relation to heritage assets or through planning designations
- Any indications of value provided by guidebooks and tourist literature, the inclusion of specific viewpoints on OS maps, provision of car parking and/or provision of interpretation materials

12.6.36 Examples of the judgements made regarding the sensitivity of visual receptors used in this assessment are described in Table 12.8.

Table 12.8 Visual receptor sensitivity

Visual receptor sensitivity	Key determining criteria
High	Receptors in this category will generally include residents, tourists/visitors, walkers, cyclists and horse riders, either stationary or travelling through the landscape, and/or undertaking outdoor recreational activities where the focus of the activity involves an appreciation of the landscape. Residential properties or settlements and related community outdoor spaces. Outdoor tourist and visitor attractions. Recreational routes (national trails, long distance footpaths) and Public Rights of Way (PRoWs); Sustrans National Cycle Routes

Visual receptor sensitivity	Key determining criteria
	(NCR); open access land/beaches and recognised scenic driving routes). People generally, undertaking recreational activity where the focus of the activity involves an appreciation of the landscape (outside internationally or nationally designated landscapes).
Medium	Receptors in this category will generally include people travelling through the landscape on road, rail or other transport routes as rail passengers and road users and people undertaking recreational and sporting activities where it is likely that their surroundings have some influence upon their enjoyment (e.g., angling and golfing).
Low	Receptors in this category will generally include people for whom their surroundings are unlikely to be a primary concern or affect how they undertake their current activity. Receptors are likely to include people at their place of work, people travelling on main roads through built up areas, dual-carriageways or motorways or taking part in activities not involving an appreciation of the landscape (e.g., playing team sports).

Evaluating the magnitude of change to the view

12.6.37 The magnitude of visual change is described as large, medium, small, or very small which is in accordance with the guidance on the use of 'word scales' provided in Paragraph 3.27 of GLVIA 3. In any instances where the proposed development will not be visible, due to screening, then this is also recorded as 'no change' in the magnitude of change column of the assessment tables and the resulting level of visual effect identified as 'None'.

12.6.38 The magnitude of visual change is assessed considering the composition of the visual baseline and is described by reference to the size and scale, geographical extent and duration/reversibility of the proposed development in accordance with GLVIA 3 as follows:

- Size and Scale: The scale of change in the view is determined by the loss or addition of features in the view and changes in the composition and extent of view affected. This can in part be described objectively by reference to the numbers and scale of new objects visible and the horizontal/vertical field of view that these new objects will occupy. Other descriptors such as 'dominant', 'prominent', 'noticeable' and 'negligible' can also be used to describe the scale of change
- Contrast: The degree of contrast or integration that will be generated by the introduction of any new features or changes in the view that will arise with the existing or remaining visual elements and characteristics in terms of form, scale, mass, line, height, colour and texture.

Developments which contrast or appear incongruous in terms of colour, scale and form are likely to be more visible and result in the generation of a higher magnitude of change

- Speed: The speed at which the proposed development may be viewed will affect how long the view is experienced (continuously, intermittently, glimpsed or repeatedly and sequentially along a route) and the likelihood of the proposed development being noticed by people travelling in cars or trains compared to those who may be walking/riding/cycling and able to stop and 'take in' a view
- Screening: The proposed development may be wholly or partly screened by landform, vegetation (including seasonal effects due to hedgerow management and seasonal variations in deciduous leaf cover) and/or buildings. Conversely visual receptors with open views, particularly from landscapes where such views are a key characteristic, are likely to be able to see a greater proportion of the proposed development
- Skyline/background: Whether the proposed development will be viewed against the skyline, or a background landscape may affect the level of contrast and magnitude, for example, skyline developments may be more noticeable, particularly where they affect open and uninterrupted horizons
- Distance: The separation distance from the proposed development can be measured objectively. Distance often provides a strong indicator of the magnitude of visual change, subject to any intervening screening of the proposed development by landform, vegetation, or buildings
- Angle of view: The angle of view may be considered in terms of whether the proposed development will be seen directly in front of a visual receptor or if it will be seen more obliquely. Road users are generally more aware of the views in their direction of travel, whilst train passengers are more aware of views perpendicular to their direction of travel. Elevated views are likely to reveal more of the proposed development, whereas low level views are more likely to be screened by intervening built form and vegetation
- Geographical extent of area over which the changes will be visible. This can be defined by the distance, area and the horizontal and vertical field of view affected
- Duration and reversibility: In accordance with GLVIA 3 this is a separate, but linked consideration and the duration of any visual effect may be described as temporary (short term 0-5 years, medium term 5-10 years or long term 10-20 years) or permanent. The project may also be considered in terms of whether the effects are reversible

12.6.39 Further guidance on the evaluation of the magnitude of visual change is provided in Table 12.9.

Table 12.9 Magnitude of visual change

Magnitude of visual change	Key determining criteria
Large	A large and prominent change to the view, appearing in the fore to middle ground and involving the loss/addition of a number of features, which is likely to have a strong degree of contrast and benefits from little or no screening. The view is likely to be experienced at static or low speed and is more likely to be continuously/sequentially visible from a route.
Medium	A moderate and prominent/noticeable change to the view, appearing in the middle ground and involving the loss/addition of features and a degree of contrast with the existing view. There may be some partial screening. The view is likely to be experienced at static or low to medium speed and is more likely to be intermittently or partially visible from a route.
Small	A noticeable or small change, affecting a limited part of the view that may be obliquely viewed or partly screened and/or appearing in the background of the view. This category may include rapidly changing views experienced from fast-moving road vehicles or trains.
Very Small	A negligible change to the view that may be obliquely viewed and mostly screened and/or appearing in the distant background or viewed at high speed over short periods and capable of being missed by the casual observer.

Types of visual effect

12.6.40 In accordance with the relevant EIA Regulations the level of visual effect is also described in terms of:

- Whether the effect will be permanent or temporary (in relation to temporary effects the duration of the effect will be important)
- Whether the effect is as a result of a change to an existing static view; sequential views; or wider visual amenity
- Whether the effect is a result of the introduction of new development or the loss of elements or features already present in the view;
- Whether the effect is judged to be positive (beneficial), neutral or negative (adverse)

12.6.41 The factors influencing judgements of whether effects are positive, neutral or negative and a consideration of cumulative effects are provided below. In describing the level of visual effect, the assessment text clearly and transparently sets out the professional judgements that have been made in determining visual sensitivity and how the value and susceptibility of each visual receptor has been assessed; and in determining magnitude of visual change how the size and scale, geographical extent and duration of the effect have been considered.

Evaluating positive, neutral and negative effects

12.6.42 It is necessary for the assessment for each townscape and visual receptor to evaluate whether the effects identified and assessed will be positive (beneficial), neutral or negative (adverse) i.e., to determine the type or valency of the effect. The default evaluation for a new development is often negative. However, not all change, including high levels of change, is necessarily negative. The TVIA considers architectural and aesthetic factors such as the visual composition of the landscape and/or townscape in the receptor's view together with the proposed development. The project may or may not be reasonably accommodated within the scale and character of the townscape as seen from the receptor location as follows:

- positive or beneficial effects will include mitigation and enhancement, combined with good townscape and architectural design quality resulting in a proposed development that can be reasonably well accommodated within the scale and townscape setting or context and/or which can be reasonably assessed as enhancing a visual receptor's view
- neutral visual effects include changes that neither add nor detract from the quality and character of an area or view including development that appears reasonably well accommodated within the scale and setting or context and includes very low magnitudes of change
- negative effects are likely to result from poor design quality such as the scale of the proposed development relative to the underlying townscape scale and landscape setting or context, or other visual factors that may reduce scenic quality, such that the development may appear dominating, over intrusive, overbearing, or oppressive for example
- The identification of negative townscape and/or visual effects can be used to formulate more effective mitigation and lead to the reduction in residual effects

Cumulative landscape and visual effects

12.6.43 The assessment of cumulative townscape or visual effects is essentially the same as for the assessment of the primary or 'stand-alone' townscape or visual effects, in that the level of effect is determined by assessing the sensitivity of the receptor and the magnitude of change, although the cumulative assessment considers the magnitude of change posed by

multiple developments. Chapter 7 of GLVIA 3 notes that this is an evolving area of practice, but provides the following definitions sourced from the most recent established guidance (Guidance: Assessing the Cumulative Impact of Onshore Wind Energy Developments, Scottish Natural Heritage, 2012) in response to wind farm development as follows:

- Cumulative effects are defined as 'the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments taken together'
- Types of cumulative landscape or visual effect can be further defined as coincidental effects experienced from a single location as follows:
- Simultaneous or combined: where two or more developments may be viewed from a single fixed viewpoint simultaneously, within the viewer's field of view and without requiring them to turn their head
- Successive or repetitive: where two or more developments may be viewed from a single viewpoint successively as the viewer turns their head or swivels through 360°
- Sequential: where a number of developments may be viewed sequentially or repeatedly at increased frequency, from a range of locations when travelling along a route within the Study Area

Significance evaluation methodology

12.6.44 The level of townscape and visual effects will be determined with reference to townscape or visual sensitivity and the magnitude of townscape or visual change experienced. For each receptor the evaluation process will be informed by use of a matrix as shown in Table 12.10 below.

Table 12.10 Level of effect

Magnitude of change	Sensitivity of receptor		
	High	Medium	Low
Large	Large (Significant)	Moderate or Large (Significant)	Moderate (Potentially Significant)
Medium	Moderate or Large (Significant)	Moderate (Potentially Significant)	Slight or Moderate (Not Significant)
Small	Moderate (Potentially Significant)	Slight or Moderate (Not Significant)	Slight (Not Significant)
Very Small	Negligible (Not Significant)	Negligible (Not Significant)	Negligible (Not Significant)

12.6.45 In line with the GLVIA 3, professional judgement is employed to assess effects, using Table 12.10 as only a starting guide. This will be achieved by the provision of clear and accessible narrative explanations of the rationale underlying the assessment made for each townscape and visual receptor over and above the outline assessment provided by use of the matrix. Matrices for townscape and visual effects are provided as a summary in support of the narrative explanations. Wherever possible cross references will be made to baseline figures and/or to photomontage visualisations to support the rationale.

12.6.46 In accordance with the EIA Regulations, it is important to determine whether the predicted effects are likely to be 'significant'. Significant landscape and visual effects, in the assessor's opinion, resulting from the proposed development will be all those effects that result in a 'large' or a 'moderate/large' level of effect and any exceptions will be clearly explained.

12.7 Mitigation

12.7.1 Measures proposed to prevent, reduce or offset (where possible and practicable) any significant adverse effects during the construction and operational phases will be identified and developed as part of an iterative design process prior to design freeze and will be identified within the ES. These measures will relate to the proposed layout, scale and materiality of the project, and the appropriateness of replacement or screening planting.

12.7.2 Primary mitigation, inherent to the Project design is referenced in Chapter 2 The Project and Chapter 3 Design Evolution. Mitigation relevant to landscape and visual effects during operation will include, but is not limited to, the following measures.

Primary

- Design and siting of permanent buildings, structures and infrastructure to limit visual intrusion as far as practicable
- Planting to help integrate the Project into the surrounding landscape

Secondary

- Use of sensitive lighting design, such as light-emitting diodes, to reduce light spill

Tertiary

- The maintenance of proposed planting will be undertaken in accordance with relevant British Standards, including BS 4428:1989 Code of practice for general landscape operations (excluding hard surfaces)

12.8 Summary of Scope for the EIA

12.8.1 A summary of receptors or impact pathways to be scoped in or out of the ES is provided in Table 12.11.

12.8.2 Assessment of construction effects will be made for the period of construction (including mobilisation). Operational effects will be assessed for Yr1 and Yr15, after the project and associated landscape proposals, have been implemented.

Table 12.11 Summary of the scope for townscape and visual amenity

Local planning authority area	Location	Potential sensitive receptors	Potential impact	Scoped In/Out	Comments
Construction phase					
LBH	Mogden STW site	Townscape Character: LBH, Isleworth – TCA T	Loss of land designated as Metropolitan Land (Other) and by LBH as Local Open Space. Some existing trees and part of the internal embankment to the east of the existing STW will be removed. Construction activities will introduce materials and equipment that is not typical of the areas e.g., tall plant and hoardings, increased HGV movements.	IN	Although at this stage it is considered unlikely that the construction activity will result in a significant effect, landscape and visual receptors have been scoped into the TVIA so that the evolving design can be reviewed to ensure no significant effects are experienced (and appropriate mitigation designed into the project design/construction method statement, if needed).

Local planning authority area	Location	Potential sensitive receptors	Potential impact	Scoped In/Out	Comments
		Visual: Residential receptors to the east: Lynton Close, Hillary Drive and Bankside Close. Residential receptors to the south: Beaumont Place and Trevor Close Recreational users of public footpath through Mogden STW	Construction activity will become an uncharacteristic addition to views temporarily experienced by visual receptors.	IN	
LBR	Intermediate shaft at Ham Lands	Townscape Character: TCA E2 - Ham Common and Riverside	Loss of existing vegetation within an area of Metropolitan Open Land. Temporary loss of an area of Metropolitan Open Land.	IN	
		Visual: Users of National Trust Ham Street Car Park Recreational users of Thames Path (north and south bank) Recreational users on the Thames	Temporary change to views experienced by visual receptors (blocking, foreshortening of views).	IN	

Local planning authority area	Location	Potential sensitive receptors	Potential impact	Scoped In/Out	Comments
		LBR Designated View E1.1 – Ham House to River Thames LBR Designated View C3.3- Twickenham Riverside East LBR Designated View C3.5 Great River Avenue, Star and Garter LBR Designated Views E3.2: Petersham Park LBR Designated Views F1.1 Richmond Terrace, Richmond Hill King Hery's Mound, Richmond Park			
LBR/RBK	Intake, outfall, reception shaft, connect-ion shaft, TLT connect-ion shaft and temporary works areas	Townscape: London Borough Of Richmond TCA E2 - Ham Common and Riverside London Borough of Kingston TCA 1 'Tudor' – and Sub Area 3 – YMCA Riverside Lands.	Temporary loss of a small section of Ham Lands MOL. Possible loss of vegetation within Ham Lands MOL. Temporary Loss of the Royal Park Gate Open Space (locally designated).	IN	

Local planning authority area	Location	Potential sensitive receptors	Potential impact	Scoped In/Out	Comments
		Visual: RBK Designated Views: 108 Views across the River Thames outside the Hawker Centre YMCA near Lower Ham Residential receptors at Burnell Avenue, Northweald Lane and Tudor Drive sites Recreational users of Ham Lands LNR Recreational users of Teddington Lock Recreational users of the Thames Path Recreational users of Sustrans Route 4 LBR Designated View B1.2. – Teddington Lock Footbridge King Hery's Mound, Richmond Park	Temporary change to views experienced by visual receptors (blocking, foreshortening of views).	IN	
Operation phase					
LBH	Mogden STW site	Townscape Character: LBH, Isleworth – TCA T	Introduction of new built form to the existing STW. Detail of the final materials, massing, height subject to design.	IN	Although at this stage it is considered unlikely that the proposed infrastructure associated with the TTP will result in a

Local planning authority area	Location	Potential sensitive receptors	Potential impact	Scoped In/Out	Comments
		Visual: Residential receptors on Lynton Close, Hillary Drive and Bankside Close Residential receptors to the south on Beaumont Place and Trevor Close Recreational users of Redlees Park Recreational users of public footpath through Mogden STW	Potential for new infrastructure to become a feature of the view, above the existing skyline of trees on site.	IN	significant effect, the listed landscape and visual receptors have been scoped into the TVIA so that the evolving design can be reviewed to ensure no significant effects are experienced (and appropriate mitigation designed into the project design if needed). It is assumed that appropriate mitigation planting is proposed within the project design, to replace any planting lost, where this is practicable. Once the planting has matured, there should be no change to the baseline landscape or visual context, as a result of the project.

Local planning authority area	Location	Potential sensitive receptors	Potential impact	Scoped In/Out	Comments
LBR/RBK	Intermediate shaft at Ham Lands and TLT connection shaft at Northweald Lane or Tudor Drive	Townscape Character: TCA E2 - Ham Common and Riverside London Borough of Kingston TCA 1 'Tudor' and Sub Area 3 – YMCA Riverside Lands.	Following completion, the remaining features will be permanent access hatches. In the context of the urban setting, it is not judged that this will appear out of character, and no significant effects will be experienced by the townscape character.	OUT	It is assumed that appropriate mitigation planting is proposed within the project design, to replace any planting lost. Once the planting has matured, there should be no change to the baseline landscape or visual context, as a result of the project.
		Visual: RBK Designated Views: 108 Views across the River Thames outside the Hawker Centre YMCA near Lower Ham Residential receptors at Northweald Lane or Tudor Drive sites Recreational users of the Thames Path Recreational users of Sustrans Route 4 Users of National Trust Ham Street Car Park	Following completion, the remaining feature will be permanent access hatches. In the context of the urban setting, it is not judged that this will appear out of character, and no significant effects will be experienced by visual receptors.	OUT	

Local planning authority area	Location	Potential sensitive receptors	Potential impact	Scoped In/Out	Comments
		Recreational users of Thames Path (north and south bank) Recreational users on the Thames LBR Designated View E1.1 – Ham House to River Thames LBR Designated Views E3.2: Petersham Park LBR Designated Views F1.1 Richmond Terrace, Richmond Hill. Residents at Tudor Drive			
LBR	Intake and outfall	Townscape Character: Townscape: London Borough Of Richmond TCA E2 - Ham Common and Riverside London Borough of Kingston TCA 'Tudor' – Sub Area 3 – YMCA Riverside Lands	Potential for the proposed infrastructure to be experienced as uncharacteristic infrastructure to the riverbanks.	IN	The listed landscape and visual receptors have been scoped into the TVIA so that the evolving design can be reviewed to help avoid significant effects being experienced (and appropriate mitigation designed into the project design if needed).
		Visual: RBK Designated Views: 108 Views across the River Thames outside the	Potential for sensitive visual receptors to experience change to views as a result of	IN	

Local planning authority area	Location	Potential sensitive receptors	Potential impact	Scoped In/Out	Comments
		Hawker Centre YMCA near Lower Ham Residential receptors at Burnell Avenue Recreational users of Ham Lands LNR Recreational users of Teddington Lock Recreational users of the Thames Path Recreational users of Sustrans Route 4 LBR Designated View B1.2. – Teddington Lock Footbridge	introduced infrastructure. This could include foreshortening of views and introduction of uncharacteristic infrastructure.		

13 Water Resources and Flood Risk

13.1 Introduction

13.1.1 This chapter of the Environmental Impact Assessment (EIA) Scoping Report sets out the proposed scope of EIA in relation to water resources and flood risk and should be read in conjunction with the description of the Project as presented in Chapter 2 The Project. The study area for the assessment of likely significant effects on these resources or receptors is also defined. The purpose of EIA Scoping is to ensure the proportionate assessment appropriately focuses on aspects and matters where a likely significant effect may occur.

13.1.2 This chapter describes the baseline conditions, with respect to water resources and flood risk, as they are understood at present. Water resources includes the surface water resources sub-aspects: hydrodynamics; geomorphology; surface water quality; and the groundwater resources sub-aspects: groundwater resources and groundwater quality. It also identifies the potential environmental effects of the Project during construction and operation and maintenance, and mitigation measures to avoid or mitigate these effects.

13.1.3 The chapter identifies where matters are proposed to be scoped out from further assessment. For those matters proposed to be scoped in for further assessment, the chapter details the EIA methodology for assessing potential effects on the water resources and flood risk resulting from the construction and operation and maintenance of the Project. The decommissioning phase has been scoped out of the EIA Scoping Report as detailed in Chapter 5 EIA Methodology, the Project is assumed to be operated within its operational parameters indefinitely.

13.1.4 The assessment of surface water and groundwater as potential receptors to contamination derived from the presence of existing ground or groundwater contamination is considered in Chapter 11 Ground Conditions and Contaminated Land. Potential impacts on aquatic or hydrologically connected protected sites and aquatic ecology within or adjacent to the Project are assessed in Chapter 10 Aquatic Ecology. Potential impacts to water quality in relation to recreation is assessed in Chapter 16 Socioeconomic, Community, Access and Recreation. Potential impacts to flood risk and water resources infrastructure in relation to climate change are assessed in Chapter 15 Carbon and Climate Change.

13.1.5 This chapter sets out the potential environmental effects of the construction and operational and maintenance phases of the Project.

13.1.6 The water abstracted from the River Thames will be taken via the Thames Lee Tunnel (TLT) to the water storage reservoirs in the Lee Valley, this water will then be subject to further treatment at existing water treatment works prior to being put into the water supply network. The assessment of water for public supply is subject to separate regulation by the Drinking Water Inspectorate. As such, this chapter (Chapter 13) does not address drinking water quality requirements of the abstracted water.

13.1.7 A Water Framework Directive (WFD) screening and scoping assessment has been undertaken following Planning Inspectorate (PINS) advice on the Water Framework Directive[263] and is in Appendix F of the EIA Scoping Report. That report covers Stage 1- WFD Regulations Screening and Stage 2- WFD Regulations Scoping stages and identifies that Stage 3- WFD Regulations Impact Assessment will follow as a next step for those waterbodies where a more detailed impact assessment is required.

13.2 Consultation and Engagement

13.2.1 Non-Statutory Public Consultation was undertaken from October 2023 to December 2023 to seek feedback about the site options for the Project from a variety of people such as landowners, residents, businesses, local authorities, and other statutory bodies who might be affected by or interested in the Project In relation to water resources and flood risk the responses tended to be general, relaying concerns about the Project's potential effects on water quality.

13.2.2 Since 2021, regular engagement has been held with the National Appraisal Unit (NAU), a unit set up to oversee environmental appraisals of strategic water resource projects with representatives from the Environment Agency (EA) and Natural England. This engagement conducted through technical working groups has included workshops, meetings, which have helped define the study area, datasets for use, additional data to collect, suitable modelling platforms, potential impacts, assessment methodologies and mitigation.

13.2.3 The engagement included environmental assessment, WFD Regulations compliance assessment. This further includes engagement with the EA's National Permitting Service regarding the pre-permit and permit application required for the discharge and the licence required for the abstraction.

13.2.4 Additionally, the Port of London Authority (PLA) was engaged with on issues relating to the Thames Tideway, with a particular focus on water level change, navigation assessment approach and findings[264], assessment of salinity and sedimentation change [265]. The engagement was undertaken predominantly using workshops with PLA representatives from various technical disciplines, but also included site visits to Richmond Half-tide Sluice and presentation at the PLA's annual meeting on the 4 March 2024.

13.2.5 On 29 July 2024, further engagement was held with representatives from London Borough of Hounslow (LBH), London Borough of Richmond upon Thames (LBR) and Royal Borough of Kingston Upon Thames (RBK) via video link. This included representatives from the Lead Local Flood Authorities (LLFA) from each Local Planning Authority (LPA) in their role as a consultee on surface water and groundwater flood risk. The Project team outlined the baseline environment in relation to water resources and flood risk and proposed assessment methodology for the EIA. Further details were provided during the meeting around potential water quality effects and approach to the assessment in relation to both human health and aquatic ecology and the permitting process around abstractions from, and discharges to, the River Thames.

13.2.6 As the Project progresses further engagement will be undertaken with the following stakeholders:

- The National Permitting Service for engagement regarding the abstraction and discharge permit for the Project
- Continued engagement with the EA regarding water resources and water quality baseline and assessment for the Project
- The EA for consultation on flood risk and flood defence impacts. This will include the EA's National Infrastructure Team
- The LLFA in each LPA who are responsible for the assessment of surface water flood risk and drainage and groundwater flood risk impacts
- The Greater London Authority (GLA) and Local Authorities for continued engagement to address regional and local concerns

13.3 Legislation and Policy Review

13.3.1 Table 13.1 sets out the legislation, policy and guidance that has been considered in the water resources and flood risk scoping assessment for the Project:

Table 13.1 Relevant legislation, policy and guidance

Relevant legislation, policy and guidance
Legislation
Environment Act 2021
The Water Resources Act 1991 as amended by the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 (EU Exit Regulations) and the Water Resources Act 1991 (Amendment) (England and Wales) and Regulations (2009)
The Water Act 2003 and Water Act 2014 as amended by the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 (EU Exit Regulations)

Relevant legislation, policy and guidance
Environmental Permitting (England and Wales) Regulations 2016, as amended by The Environmental Permitting (England and Wales) (Amendment) (EU Exit) Regulations 2019)
The Environment (Amendment etc.) (EU Exit) Regulations 2019
The Water Supply (Water Quality) Regulations 2018
Conservation of Habitats and Species Regulations 2017
The Water Abstraction and Impounding (Exemptions) Regulations 2017
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
The Groundwater (Water Framework Directive) (England) Directions 2016
The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015
Environmental Damage (Prevention and Remediation) Regulations (England) 2015
The Nitrate Pollution Prevention Regulations 2015
Flood and Water Management Act 2010
The Water Resources (Abstraction and Impounding) Regulations 2006
Urban Waste Water Treatment (England and Wales) Regulation 1994, transposed from the EU Directive; Urban Wastewater Treatment Directive 91/271/EEC (as amended)
Anti-Pollution Works Regulations 1999
Environment Act 1995
The Land Drainage Act 1991
Water Industry Act 1991
Environmental Protection Act 1990
National policy, standards and guidance
NPS for Water Resources Infrastructure 2023[266]
The National Planning Policy Framework (NPPF) (2023)[267]. It is noted that the NPPF was under consultation until September 2024
National Planning Practice Guidance (NPPG) DCLG 2023
Flood Risk Assessments: Climate Change Allowances (Environment Agency, 2022)

Relevant legislation, policy and guidance
Flood and Coastal Erosion Risk Management: Policy Statement (DEFRA, 2020)
Flood Risk and Coastal Change (2022)
A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)
Catchment Flood Management Plans (CFMPs) (EA, 2009)
Regional and local policy
Thames River Basin District Flood Risk Management Plan 2021 to 2027 (2022)
The London Plan 2021[268]
London Sustainable Drainage Action Plan (2015)
Securing London's Water Future (2011)
Managing Risks and Increasing Resilience The Mayor's Climate Change Adaptation Strategy (2011)
River Basin Management Plans (2022)
The LBH Local Plan 2015 - 2030[269] and the LBH Local Plan 2020 - 2041 (emerging policy) Hounslow Strategic Flood Risk Assessment (2018) Hounslow Surface Water Management Plan (2021) Hounslow Local Flood Risk Management Strategy (2022)
The LBR Local Plan 2015 - 2018 and the LBR 'Pre-Publication' Draft Local Plan (2024)[270] Richmond Strategic Flood Risk Assessment Level 1 Update (2020, minor updates 2021)
The RBK Core Strategy 2012 and Kingston's Local Plan 2019 - 2041 (Regulation 18) (emerging policy)[271] RBK Strategic Flood Risk Assessment (2021)

13.4 Existing Environment and Baseline Conditions

Study area

13.4.1 The water environment setting in the vicinity of the Project is shown in Plan 13.1 in Appendix A, which identifies the wider water environment and WFD waterbodies from which the study area was determined. For management planning purposes, the WFD divides the water environment into waterbodies: river catchments, lakes (including reservoirs), groundwaters, transitional

waters (estuaries), coastal waters, and surface water transfers. Where the Project is in the vicinity of or could potentially impact these waterbodies, the whole waterbody has been included in the study area.

13.4.2 The study area for the water resources and flood risk aspect area is shown in Figure 13.1. The potential impact of construction and operation activities will be assessed on any water features including surface water and groundwater) 2km area of the boundary to the Project sites. In addition, operational impacts will be assessed on any water features which form part of the Thames Tideway to Battersea Bridge and selected of Thames Water's Lee Valley reservoirs in north. The study area was identified based on professional judgement having regard of sensitive receptors and potential pathways. The study area was identified based on professional judgement having regard of sensitive receptors and potential pathways.

13.4.3 The study area is within the freshwater river WFD waterbody of the River Thames (Egham to Teddington) where the proposed intake and outfall are located. The other surface construction activities are in the vicinity of the River Crane, a river waterbody; and the Duke of Northumberland's River which is an artificial channel and is classified by the EA as a 'surface water transfer' WFD waterbody (Figure 13.1). There is a non-WFD waterbody in the vicinity of the Mogden STW site, the Whitton Brook.

13.4.4 The underlying superficial groundwater body is the Lower Thames Gravels waterbody.

13.4.5 The study area is also in the vicinity of the Tidal Thames and the transitional (estuarine) Thames Upper waterbody is included in the study area. The study area is also in the vicinity of the tidal Thames and the transitional (estuarine) Thames Upper waterbody is included in the study area. The tidal Thames starts on the downstream side of the Teddington Weir and flows 100km to the North Sea. The narrow upper part of the estuary, with characteristics of a tidal river, is referred to as a tideway. For the water resources aspect area operational impacts, the Thames Tideway component of the study area extends for the 22km from Teddington Weir, beyond the Richmond Half-tide sluice seawards to Battersea Bridge, which is the extent of the Thames Upper waterbody. This section, the upper estuary, is influenced by river conditions, both flow and quality, and therefore potentially impacted by operation of the Project. Seawards of Battersea Bridge, marine conditions exert greater influence on estuarine processes, in the middle estuary, especially at the times of low river flow conditions and low river influence when the Project's intake and outfall would be abstracting and discharging.

13.4.6 The abstracted water will be taken to the Lee Valley reservoirs via the TLT. Specifically, the TLT has connections via the Lockwood pumping station to Lockwood Reservoir, Banbury Reservoir and High Maynard Reservoir, each

of which are WFD lake waterbodies. On account that the water abstracted from the River Thames will be sent to Lockwood Reservoir, Banbury Reservoir and High Maynard Reservoir the study area with respect to water quality includes these three reservoirs as shown on Plan 13.1 in Appendix A Plans.

13.4.7 The discharge rate to the reservoirs via the TLT will remain within the current permitted discharge rates and therefore the Project will have no change to flood risk at Lockwood Reservoir, Banbury Reservoir and High Maynard Reservoir.

Baseline conditions

Existing baseline

13.4.8 Figure 13.1 shows the Project and the waterbodies being considered in this assessment.

13.4.9 The baseline environment has been determined making use of the data sources shown in Table 13.2. The data includes data which has been collected as part of an extensive water quality monitoring programme which is currently ongoing. The monitoring network was designed with engagement with NAU to provide baseline data within the study area and in locations of identified receptors. The data is included as part of the assessments undertaken within the Gate 2 Reports[272,273]. Further survey and monitoring work related to water quality will continue to support the EIA work that will be reported in the Preliminary Environmental Information (PEI) Report and ES.

Table 13.2 Baseline Data Sources

Dataset	Dataset description	Data source
Water quality (water temperature; physico-chemical water quality; nutrient concentration; salinity; chemical water quality (human health, ecotoxicology and fish olfaction inhibition); underlying water chemistry (including pH))	Environment Agency WIMS*	Environment Agency
	Spot samples collected for Project baseline[274]	Thames Water
	Automatic water Quality Monitoring Sondes (AQMS)*	Environment Agency
	Continuous Monitoring Sondes[5]	Thames Water
	TELEMAC estuarine quality model	Thames Water
	Catchment Data Explorer*	Environment Agency
	RBMP*	Environment Agency

Dataset	Dataset description	Data source
Topographical information	Topographical Mapping*	Ordnance Survey
River maps	OS Open Rivers*	Ordnance Survey
Special site designations	Sites of Special Scientific Interest England, Ramsar Sites, Priority River Habitats*	Natural England
River bank geometry, channel geomorphology and River Morphology Survey	Measured data[5]	Thames Water
Water levels	Teddington Lock; measured data*	Environment Agency
	Tidal Thames; TELEMAC 3D	Thames Water
Flow and discharge flow	19,200-year stochastic flow	Water Resources South-East group
	River flow gauges*	Environment Agency
	Measured discharge flow data[5]	Thames Water
	River Thames; TELEMAC 2D	Thames Water
	Tidal Thames; TELEMAC 3D	Thames Water
Abstraction	Surface Water Licences and unlicensed private abstraction *	Environment Agency/Local Authority
Discharges	Surface water consents *	Environment Agency
Geology and hydrogeology	Aquifer Extents and Hydraulic parameters *	British Geological Survey
Protective designations	Ground Water Special Protection Zone, Nitrate Vulnerable Zone *	Environment Agency
Flood risk	Flood risk mapping *	Environment Agency

* Publicly available data

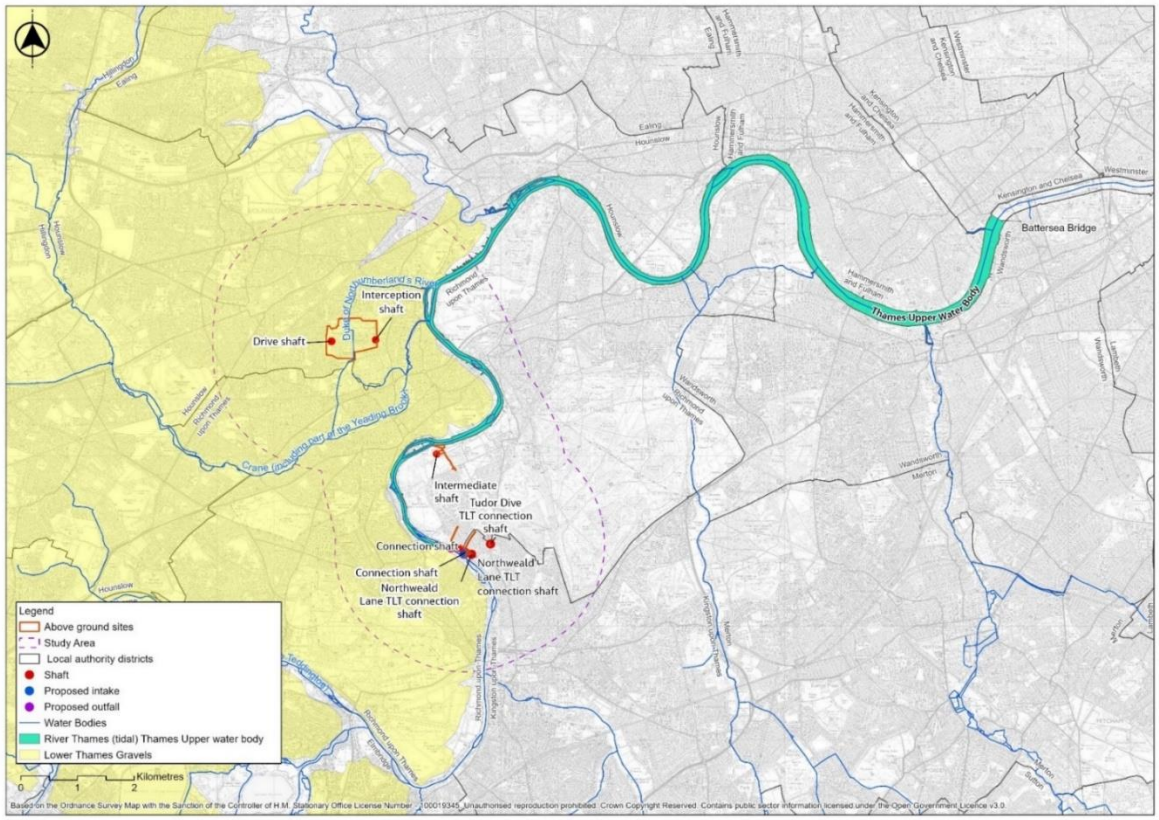


Figure 13.1 Aspect study Area

Surface Water Resources

13.4.10 The Project's study area is covered by five WFD surface waterbodies. The intake and outfall are in the WFD river waterbody Thames (Egham to Teddington). This reach of freshwater river stretches approximately 26km from Egham to Teddington and is characterised as a wide slow flowing lowland river, with water level controlled by numerous weirs operated by the EA.

13.4.11 The Crane WFD river waterbody meets the estuarine Thames Tideway just upstream of the Isleworth Ait, with Whitton Brook as a tributary. The study area lies within the catchment of the River Crane but has no hydrological interactions with the River Crane itself.

13.4.12 The Duke of Northumberland's River flows from the River Crane in Twickenham through the Mogden STW site and to the Estuarine Thames Tideway downstream of the Isleworth Ait. The Duke of Northumberland's River is an artificial channel and is considered by the EA as a 'surface water transfer' WFD waterbody. The Whitton Brook is a non-WFD waterbody within the catchment.

13.4.13 The Thames Upper is a WFD transitional waterbody that stretches approximately 22km along the Thames Tideway from the tidal limit at Teddington Weir to Battersea. The Thames Tideway seawards from the

Richmond Half-tide sluice experiences the full ebb and flood tidal cycle with high and low tides twice a day. Between the normal tidal limit at Teddington Weir and Richmond Half-tide sluice, water is penned for navigational requirements and the normal tidal cycle is only between high tide and mid tide. Teddington Weir is the normal tidal limit between river and estuary, but it is observed to overtop at high tide on spring tides. The existing Mogden STW discharge is through a system of outfalls in the bed of the Thames Tideway at Isleworth Ait.

13.4.14 Water abstracted from the River Thames by the Project will be sent to either of Lockwood Reservoir, Banbury Reservoir or High Maynard Reservoir, each WFD lake waterbodies, via the existing TLT.

13.4.15

13.4.16 Table 13.3 summarises the WFD status of the waterbodies and their attributes. It should be noted that the 2019 waterbody classifications inform RBMP3 (River Basin Management Plans)[275].

Table 13.3 Summary of Water Framework Directive Regulations surface waterbodies in the study area

	Thames (Egham to Teddington)	Crane	Lower Duke of Northumberland's River	Thames Upper	Lockwood Reservoir	Banbury Reservoir	High Maynard Reservoir
WFD ID	GB106039023232	GB106039023030	GB806100095	GB530603911403	GB30641865	GB30647003	GB30641884
Waterbody type[276]	River	River	Surface Water Transfer	Transitional water	Lake	Lake	Lake
Hydromorph-ological designation	Heavily modified	Not designated as heavily modified	Artificial	Heavily modified	Artificial	Artificial	Artificial
Length (km)	31.5	13.7	4.1	-	-	-	-
Surface area (km^2)	-	-	-	3.3	0.3	0.3	0.1
Catchment area (km^2)	44.8	57.1	-	-	-	-	-
Waterbody classification River Basin Management Plan Cycle 3 (2019)							
Ecological	Poor	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Chemical	Fail	Fail	Fail	Fail	Fail	Fail	Fail

13.4.17 The new conveyance tunnel, from Mogden STW to the River Thames near Burnell Avenue, would be bored at a depth of around 20-30m for the majority of the route. This route passes underneath the Thames Tideway, River Crane and Whitton Brook. There are no above ground Project construction or operational works planned close to the River Crane or Witton Brook.

13.4.18 At the Mogden STW site the Project will see works being undertaken in the west and eastern parts of the site as described in Chapter 2 The Project. These works will include a new tunnel that would pass under the Duke of Northumberland's River.

13.4.19 The proposed intake and outfall are positioned at the edge of the Thames (Egham to Teddington) waterbody just upstream of Teddington Weir. The existing Mogden STW outfall is located approximately 7km downstream of the Project outfall and intake locations, located within the Thames Tideway and would discharge at a lower volume during times the Project is operating. During times when the Project is not required to operate there will be a requirement to continue to run the TTP at reduced levels to maintain the operability of the TTP as set out in Chapter 2 The Project. The recycled water produced during this period will be added to the STW final effluent channel and discharged at the existing Mogden STW outfall.

13.4.20 There is a significant volume of hydrological and water quality baseline data available from the EA, including routine monitoring as well as targeted Thames Water monitoring specific to the Teddington DRA scheme. These datasets have been analysed and are documented in the Gate 2[277] Physical Environment and Water Quality Assessment Reports[278]. These datasets have informed the existing baseline.

13.4.21 The ongoing water quality monitoring as part of the Project includes the use of both automatic and continuous water quality monitoring sondes by Thames Water and the EA. Monitoring focuses on water temperature, physico-chemical water quality, nutrient concentrations, salinity, and chemical water quality. This monitoring network, designed in collaboration with the NAU, provides baseline data across the study area, particularly in locations of identified receptors. The gathered data will inform the EIA and support ongoing and future environmental reporting for the Project. Current monitoring data is in draft and programmed for finalisation to support PEI Report and ES.

13.4.22 In terms of water quality monitoring, river temperature has been measured in River Thames, and data sourced from measurements taken at Teddington since 2010 have been used to establish water temperature baseline conditions for the freshwater reach of the River Thames where the outfall and intake are proposed. The data shows that there is a clear seasonal trend which shows colder water in winter months and warmer in summer months

with a maximum value of approximately 24ºC and minimum value of approximately 2ºC [4].

13.4.23 A TELEMAC-2D model is being developed for the freshwater reach of the River Thames between Molesey and Teddington Weir to support the assessment of the hydrodynamic baseline of the freshwater River Thames and the potential impact of operation of the Project's intake and outfall on river currents, flow velocity, water level and mixing of the discharge from the outfall into the river. The modelling focuses on an extent 270m upstream of the proposed intake and immediately downstream of Teddington Weir. The flows in the simulated channel reach are calibrated against measured flows.

Groundwater Resources

13.4.24 A detailed baseline of the geology underlying the Project is provided in Chapter 11 Ground Conditions and Contaminated Land. This current section (within Chapter 13) focuses on the baseline in relation to groundwater quality and resource.

13.4.25 The onshore geological mapping held by the British Geological Survey (BGS)[279] shows that the bedrock geology underlying the EIA Scoping Boundary is classified as "*London Clay Formation - Clay and Silt*" (see Table 13.4). The formation is typically recorded as clay and silt in variable proportion, with occasional cementstone nodules, pockets of sand and flint gravel. This stratum is classified as an unproductive bedrock aquifer with low permeability and little groundwater movement[280]. The London Clay strata are in turn underlain by the Harwich Formation, the Lambeth Group and Upper Chalk. Conceptual geological modelling provided in Chapter 11 indicates that the London Clay underlying the EIA Scoping Boundary to be thick which allows the conveyance tunnel to be routed wholly within London Clay. Additional data to facilitate the detailed design is currently ongoing with geotechnical investigation works.

Table 13.4 Summary of Project geology, superficial deposits and aquifer classification

Shaft sites	Bedrock		Superficial deposits	
	Geology	Aquifer classification	Geology	Aquifer classification
Mogden STW	London Clay Formation - clay and silt	Unproductive	Langley Silt Member - clay and silt. Taplow Gravel Member - sand and gravel.	Unproductive Principal
Ham Street Car Park (intermediate shaft)	London Clay Formation - clay and silt	Unproductive	Alluvium - clay, silt, sand and peat.	Secondary (undifferentiated)
Ham Playing Fields (intermediate shaft)	London Clay Formation - clay and silt	Unproductive	Kempton Park Gravel Member - sand and gravel.	Secondary A/Principal
Burnell Avenue	London Clay Formation - clay and silt	Unproductive	Kempton Park Gravel Member - sand and gravel.	Secondary A
Northweald Lane (TLT connection shaft)	London Clay Formation - clay and silt	Unproductive	Kempton Park Gravel Member - sand and gravel.	Secondary A
Tudor Drive (TLT connection shaft)	London Clay Formation - clay and silt	Unproductive	Kempton Park Gravel Member - sand and gravel.	Secondary A

13.4.26 The superficial deposits underlying each of the proposed above ground sites have some variation, as detailed below and listed in Table 13.4:

- Langley Silt Member - clay and silt. These deposits underly part of the Mogden STW site. This stratum is classified as an Unproductive superficial deposit aquifer
- Taplow Gravel Member - sand and gravel. These deposits underly part of the Mogden STW site. This stratum is classified as a Principal aquifer and can facilitate groundwater movement
- Alluvium - clay, silt, sand and peat. These deposits are present at the Ham Street Car Park site and in-river area at Burnell Avenue. This stratum is classified as a Secondary undifferentiated aquifer, which has the potential to facilitate groundwater movement
- Kempton Park Gravel Member - sand and gravel. These deposits are present for Ham Playing Fields, Burnell Avenue, Northweald Lane and Tudor Drive sites as indicated in Table 13.4. This stratum is classified as both Principal Aquifer for the section on the left bank of the Thames (included in the Lower Thames Gravels Groundwater Body) and as Secondary A superficial aquifer and can facilitate groundwater movement

13.4.27 Surface water and shallow groundwater interaction is likely to be notable due to the shallow water table and the high permeability of the superficial deposits underlying the sites. The National River Flow Archive indicates a baseflow index (BFI) value of 0.63 for the River Thames at Kingston[281], also suggesting a significant baseflow component to the river. The shallow groundwater is perched above the thick low permeability London Clay which isolates this water from the underlying bedrock aquifers below.

13.4.28 For the superficial deposits within the study area which are in close proximity to the River Thames such as at intermediate shaft sites and Burnell Avenue, the likely groundwater flow would be towards the river. Groundwater flow direction within the superficial deposits underlying the Mogden STW site is currently unknown. Limited ground flow is expected in the London Clay Formation due to the low permeability of its strata.

13.4.29 The Lower Thames Gravels Water Body (GB40603G000300) underlies the northern bank of the Thames within the study area, with waterbody classification (2019) of: overall classification of Poor; chemical classification of Good; and quantitative classification of Poor.

13.4.30 No Source Protection Zone (SPZ) associated with either public or private water supplies is recorded as being present within the study area[282]. The study area is not within a surface Nitrate Vulnerable Zone (NVZ)[283].

13.4.31 The Project is situated across areas of medium and high groundwater vulnerability associated with the superficial Principal and Secondary aquifers. This results in the aquifers being susceptible to the easy transmission of pollutants to groundwater due to the presence of high-leaching soils.

13.4.32 A review was carried out of active groundwater abstractions in proximity to the Project, details of which are provided in the Groundsure report. This review considered abstractions which could potentially be hydraulically connected to the aquifers. The review identified that the majority of the licenced abstractions are situated over 1,000m from the EIA Scoping Boundary and were not of sufficient abstraction rate which would indicate hydraulic connection to the groundwater within the EIA Scoping Boundary. However, two records of active groundwater abstractions for spray irrigation are present within 250m of the EIA Scoping Boundary. These licenced abstractions are situated some 100m west of Burnell Avenue. The borehole data does not indicate whether the boreholes abstract groundwater from the superficial deposits or the underlying Upper Chalk bedrock aquifer.

13.4.33 The EA holds records of one monitoring borehole near the Burnell Avenue site close to Teddington weir[284] with National Grid Reference TQ1683871678 which is publicly available. The groundwater levels recorded in the well are relatively shallow typically ranging between 4m and 5m below the existing ground level. No information is currently available regarding the well depth and construction. Further information on nearby abstractions and monitoring wells will be obtained from the EA to support the environmental assessment that will be reported in the ES.

13.4.34 Ground Investigation (GI) works are currently underway, including groundwater monitoring, to provide further information on key aspects that will support the EIA. These investigations are focused on:

- Confirming the depth and thickness of the London Clay along the conveyance route, and
- Assessing the groundwater levels within the superficial deposits within the EIA Scoping Boundary

Flood Risk

13.4.35 The EA flood zones provide an indication of the probability of river and sea flooding to each shaft site (see Table 13.5 below), excluding the presence of defences. The risks presented by each flood zone are classified in Table 13.6. The Project's new conveyance route between Mogden STW and the River Thames will be located at a depth of around 20-30m for the majority of the route, passing below the River Thames and the River Crane, with the final alignment and profile to be determined following further surveys and detailed design. The tunnelled sections are not expected to present a flood risk and the tunnel will be flood resistant and sealed to convey water inside. The tunnel will pass below flood defences, including two walls on the River Crane and a wall and embankment on the River Thames. However, the Project is not expected to impact the flood defences due to the depth, tunnel design and utilisation of good construction practices. Therefore, the conveyance route tunnels have been scoped out of flood risk due to having a negligible impact.

Table 13.5 EA flood zone definitions

Flood zones	Risk	Definition
Zone 1	Low	Land having a less than 0.1% Annual Exceedance Probability (AEP) of river or sea flooding.
Zone 2	Medium	Land having between 1% and 0.1% AEP of river flooding, or land having between 0.5% and 0.1% AEP of sea flooding.
Zone 3a	High	Land having a 1% or greater AEP of river flooding or land having a 0.5% or greater AEP of sea flooding.
Zone 3b	The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood.

13.4.36 All sites with above ground infrastructure, apart from Northweald Lane and the Tudor Drive TLT connection shaft site, have some areas located in Flood Zone 3, with the Mogden STW site containing the Duke of Northumberland's River and the other sites affected by the River Thames (Table 13.6). Northweald Lane has a small area of the shaft site located in Flood Zone 2 and the Tudor Drive TLT connection shaft site is entirely located in Flood Zone 1. The flood zones are shown in Figure 13.2.

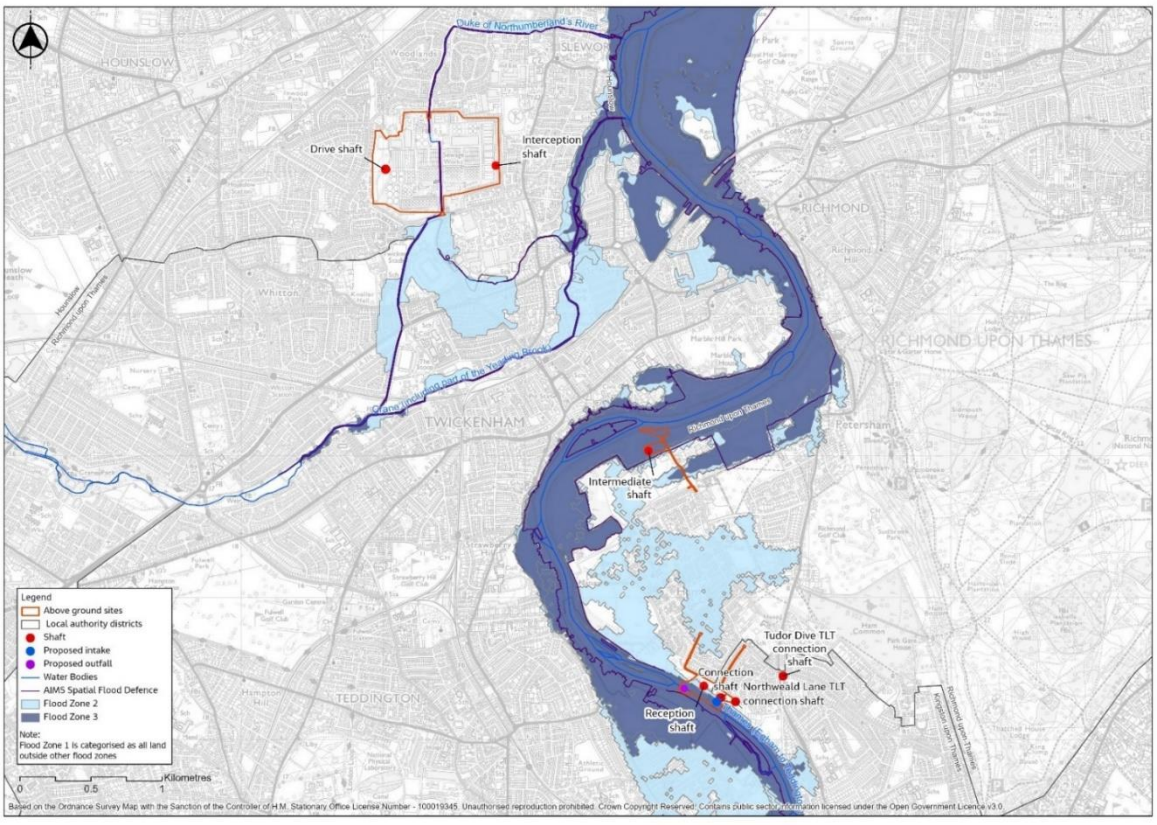


Figure 13.2 Flood zone map

13.4.37 Environment Agency Product 4 data has been requested to determine the flood risk model information held by the EA for the Project's above ground site locations in Flood Zone 3 and Flood Zone 2. These models will provide the detailed baseline flow rates, flood levels and flood extents to assess the fluvial and tidal flood risks at these sites as well as describing the historic fluvial and tidal flood events at the sites. A topographical survey will also be used at the sites to determine the flood depths and extents at the sites from the EA hydraulic models.

13.4.38 The Surface Water (Pluvial) Flood map provided by the EA shows that the Mogden STW site contains areas with a high risk of surface water flooding (above 3.3% AEP). However, the surface water flood maps are unlikely to have accounted for the surface water drainage system located on-site, so it is likely that this is an over-estimate of the surface water flood risk. The Burnell Avenue and Northweald Lane sites have areas containing a moderate risk of surface water flooding (between 3.3% AEP and 1% AEP), Tudor Drive site has areas at low risk of surface water flooding (between 0.1% and 1% AEP), and the two Ham Street sites have the entire area as very low risk of surface water flooding (less than 0.1% AEP) (Table 13.6). While this assessment considers the surface water flood risk across the entire shaft sites, the shaft locations are still in design and may not be located in an area of the site at risk from surface water flooding. The surface water flood extents are shown in Figure 13.3.

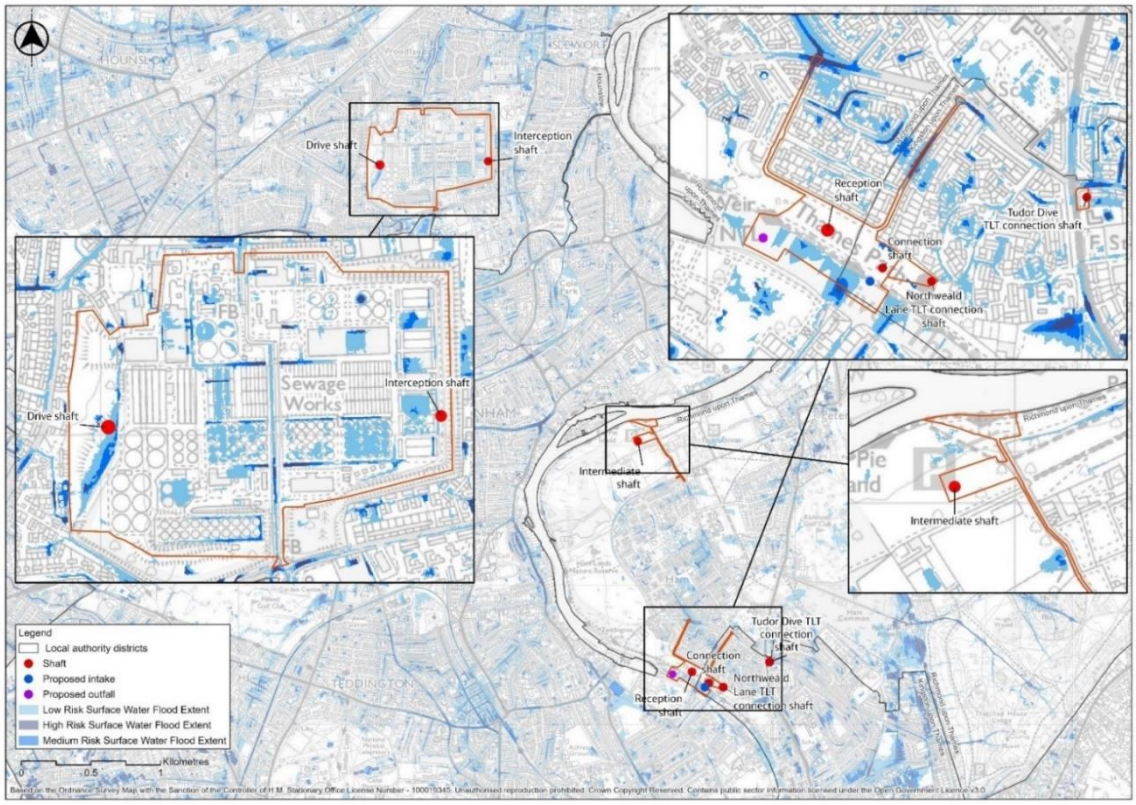


Figure 13.3 Surface water flood extents map

13.4.39 For sewer flooding, Strategic Flood Risk Assessments (SFRAs) have provided the number of public sewer flood incidents within each postcode area. These do not indicate whether a shaft site has been flooded by public sewer flooding, as the exact locations of the sewer flood incidents are unknown. As summarised in Table 13.6, the shaft site with the highest number of public sewer flood incidents in the postcode area is the Tudor Drive site, with 34 to 97 public sewer flood incidents between 1988 and 2021 which is the most recent data held publicly. Ham Street Car Park and Burnell Avenue shaft sites have one or two public sewer flood incidents in the postcode area and no public sewer flood incidents within the Mogden STW, Ham Playing Fields and Northweald Lane postcode areas.

13.4.40 The EA Reservoir Flood maps show that three potential shaft sites (Ham Street Car Park (intermediate shaft), Ham Playing Fields (intermediate shaft), and Burnell Avenue) are located in the maximum reservoir flood extents when river levels are normal, with the Mogden STW, Tudor Drive and Northweald Lane shaft sites are located in reservoir flood extents when the river is also flooding. Reservoir flooding presents a residual flood risk to the site.

13.4.41 The SFRA maps for each Local Authority have been reviewed for groundwater. These maps show the likelihood of groundwater flooding per square kilometre. The Mogden STW site is located across three 1km squares with differing proportions of groundwater emergence ranging from high to very low likelihood. The intermediate shaft at Ham Playing Fields is located across two 1km squares, with the proportion of groundwater emergence ranging from low to very low likelihood. The other shaft sites are all located in 1km squares with a very low likelihood of groundwater emergence, as detailed in Likely Significant.

13.4.42 All sites, apart from Mogden STW, are located in areas which are primarily permeable with the potential for surface water to infiltrate into the ground. The Mogden STW site contains areas of impermeable ground due to the infrastructure. However, it is assumed that the impermeable areas at this shaft site would be drained by an artificial drainage system.

13.4.43 The Project will convey up to 75Ml/d of water via the TLT to Lockwood Reservoir, Banbury Reservoir and High Maynard Reservoir during low flow conditions. Since this water will only be conveyed during low flow conditions when water levels in the reservoir are low, it is not expected that the Project will increase the flood risks presented at the reservoirs to either the reservoir itself or the surrounding areas. Therefore, Lockwood Reservoir, Banbury Reservoir and High Maynard Reservoir have been scoped of flood risk due to having a negligible impact.

13.4.44 The baseline flood risk and drainage attributes for each above ground sites are summarised in Table 13.6.

Future baseline

13.4.45 Climate change is expected to increase sea levels, peak rainfall intensities and peak river flows. These changes are expected to increase the flood risks for the future baseline, with larger flood extents and depths from rivers, sea and surface water for sites located in high to low flood risk areas. This will be assessed using the EA guidance included in National Policy in section 13.3. Climate change impacts on the water environment are also considered in Chapter 15 Carbon and Climate Change.

Table 13.6 Project flood and drainage summary (excluding groundwater)

Site	Fluvial and coastal		Surface water	Groundwater	Sewers	Reservoirs	Drainage
	Nearest river presenting flood risk	Highest EA flood zone	Highest EA surface water classification	EA areas susceptible to groundwater flooding (% of 1km square susceptible to groundwater flooding)	No. of public sewer flood incidents within the postcode area	Environment Agency reservoir flood extents	Located primarily in a permeable or impermeable area
Mogden STW	Duke of Northumberland's River	3	High	High (>75%); Medium (50% - 75%); Very Low (<25%)	0	When rivers are flooding	Impermeable
Ham Street Car Park (intermediate shaft)	River Thames	3	Very Low	Very Low (<25%)	1	When river levels are normal	Permeable
Ham Playing Fields (intermediate shaft)	River Thames	3	Very Low	Low (25% - 50%) Very Low (<25%)	0	When river levels are normal	Permeable
Burnell Avenue	River Thames	3	Moderate	Very Low (<25%)	2	When river levels are normal	Permeable
Northweald Lane (TLT connection shaft)	River Thames	2	Moderate	Very Low (<25%)	0	When rivers are flooding	Permeable
Tudor Drive (TLT connection shaft)	N/A	1	Low	Very Low (<25%)	34 - 97	When rivers are flooding	Permeable

13.5 Sensitive Receptors and Potential Environmental Effects

Sensitive receptors

13.5.1 Sensitive receptors of the Project associated with water resources and flood risk have been determined by professional judgement and in accordance with guidance in the Design Manual for Roads and Bridges (DMRB)[285]. The potential sensitive receptors comprise the following:

- Surface waterbodies in the study area (including riverbeds and banks, as shown in Figure 13.1)
  - Thames Tideway (Thames Upper waterbody)
  - Freshwater River Thames (Egham to Teddington waterbody)
  - Crane Surface waterbody
  - Duke of Northumberland's River
  - Lockwood Reservoir
  - Banbury Reservoir, and
  - High Maynard Reservoir
- Groundwater Bodies (as shown in Table 13.4)
  - Lower Thames Gravels Groundwater Body/Principal Aquifer (comprising the Taplow Gravel and part of the Kempton Park Gravel Member, Harwich Formation, Lambeth Group, Upper Chalk Aquifer (Principal Aquifer)
  - Secondary A and B aquifers (Kempton Park Gravel Member, Alluvium)
- River bed and river banks of all surface waterbodies
- Local surface water and groundwater abstractors
- Water-related infrastructure (including public water supply, public sewers and other drainage infrastructure) limited to the study area
- Flood defence infrastructure limited to the study area
- Project construction works and construction workers
- Off-site developed areas limited to the study area and areas downstream from the study area

Potential environmental effects

13.5.2 An appraisal of the potential effects due to the construction and operational phases of the Project has been undertaken to determine the scope of this chapter in the Environmental Statement (ES), as set out below. This has considered all aspects of the water environment, legislative protections, local and regional policies, and baseline conditions and proximity of the potential receptors. This information was used to make a professional judgement about the likelihood of the potential environmental effects, with the potential environmental effects scoped in for each area shown below. Potential

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

Surface Water Resources

Construction phase impacts that are proposed to be Scoped In

13.5.3 Construction of the Project's intake and outfall structures in the bank or bed of the River Thames could lead to some localised impact on the geomorphology of the channel bank and bed. Locally at construction sites with pathways to surface waters, there is risk of temporary impacts on surface water quality from construction activities: dewatering and contamination (such as accidental fuel spill, sediment runoff and the introduction of silt to the river, concrete runoff).

Construction phase impacts that are proposed to be Scoped Out

13.5.4 The potential effects of the Project on water resources from water use for construction phase activities are proposed to be scoped out. The construction phase of the Project will not require significant volumes of water use.

13.5.5 The potential effects of the Project on public foul water sewer infrastructure are proposed to be scoped out.

13.5.6 The Mogden STW site and Tudor Drive site have been assessed as low risk during the construction phase and are proposed to be scoped out of further assessment for the surface water resources and in the EIA. The sites are not hydrologically connected to any watercourses.

Operational phase impacts that are proposed to be Scoped In

13.5.7 Operation of the Project would be for the benefit of resilient public water supplies, as set out in section 1.5. The Project would operate at times of low river flow in the River Thames, when abstraction for public water supply is limited to ensure environmental protection. Operation would only change river flow between the intake and outfall and maintain protection of these environmentally important river flows downstream. As such, operation of the Project would help to avoid water resources shortages and provide resilience to developing water resources drought. Operation would continue during drought conditions, until low river flows have returned to normal flow conditions.

13.5.8 The operation of the Project will result in local, temporary flow changes in the River Thames. These changes relate to the abstraction of raw water from the Project's River Thames intake to support reservoir storage in the Lee Valley reservoirs as part of the supply of drinking water to London. Operation would only change river flow locally between the intake and outfall, with the same volume of recycled water entering the river as the volume abstracted.

13.5.9 Abstraction at the Project's intake, occurring during low river flow conditions, has the potential to locally impact river currents and river velocities, which may in turn impact geomorphological processes in the river such as sedimentation rates. River levels would remain the same as these are controlled by the weir level at Teddington Weir.

13.5.10 The input of recycled water, from the TTP, at the outfall would restore river flows and river velocities to those without the Project - in the length of remaining freshwater River Thames to Teddington Weir, and the river's contribution to the estuarine Thames Tideway over the weir. As the recycled water mixes into the river water locally at the Project's outfall, there is potential for impact on the low river currents and low river velocities at times of low flow. The recycled water itself has the potential for impact on water quality standards in the River Thames, noting this would be treated at the TTP and would be subject to a discharge permit from the EA to ensure environmental protection. River and recycled water temperatures are similar during summer months, but seasonal differences in water temperature between the recycled water and river water identify there is the potential for impact on water temperature in the River Thames at the outfall itself, dispersing with river flow.

13.5.11 Where there is potential for the recycled water to effect the water quality or water temperature of the freshwater River Thames, there is the potential for water passed forward over Teddington Weir to effect the water quality and temperature in the estuarine Thames Tideway. Further investigation to be undertaken to determine the significance of the effect in the freshwater River Thames.

13.5.12 Operation of the Project would reduce the volume of final effluent from Mogden STW discharged to the Thames Tideway at Isleworth Ait. At these times the quality of the final effluent would remain as without the Project. The reduction in discharge from Mogden STW to the upper estuary at times of low river flow is a beneficial impact of the Project. The thermal load added to the upper estuary by the final effluent would also reduce at times of low river flow, also a beneficial impact of the Project. The reduction in final effluent would reduce the volume of water entering the upper estuary which has the potential to impact on tidal hydrodynamics, geomorphological processes and salinity in the estuarine Thames Tideway.

13.5.13 At times when the Project's intake is not operational, there would be no discharge at the Project's outfall. At these times the TTP would remain operational and recycled water would be discharged with the final effluent from Mogden STW discharged to the Thames Tideway at Isleworth Ait. At these times the volume of the final effluent would remain as without the Project, but the quality would be improved. The improvement in the

discharge from Mogden STW to the upper estuary at times of normal and high river flow is a beneficial effect of the Project.

Operational phase impacts that are proposed to be Scoped Out

13.5.14 The impacts on public water supply infrastructure and public foul sewer infrastructure are scoped out. The operation of the Project will not require water use or the discharge of foul wastewater so this will not reduce the capacity contained in foul sewers.

13.5.15 Lockwood Reservoir, Banbury Reservoir and High Maynard Reservoir have been assessed as at low risk during the operational phase and are proposed to be scoped out of further assessment. Abstraction of water through the Project's river intake at Teddington would result in a portion of the water in the TLT being sourced from a different abstraction location on the freshwater River Thames than the current source. The current source is located upstream of Teddington at the existing Hampton intake, and abstraction from the current source to the TLT is likely to continue during operational periods of the Project. Water quality at the two locations on the River Thames is similar and waters from the two sources would be mixed within the TLT and with water already in the three specific Lee Valley reservoirs at the time of operation. As such there is an only slight risk of environmental effects due to the Project at Lockwood Reservoir, Banbury Reservoir or High Maynard Reservoir.

13.5.16 Operation of the Project would have no impact on surface water resources at any of the terrestrial construction sites.

Groundwater Resources

Construction phase impacts that are proposed to be Scoped In

13.5.17 The Project's proposed pipeline between the intake and TLT would be constructed below ground within superficial deposits. Construction activities in the vicinity of the intake pipeline therefore have the potential to lead to temporary environmental impacts to groundwater resources.

13.5.18 Excavation works, such as in the construction of the shafts, has the potential to cause localised changes in water quality in the superficial aquifers and may include mobilisation of pollutants on site.

13.5.19 Excavation and dewatering activities have the potential for impacts on groundwater flow and levels in the superficial deposits. The dewatering phase also has the potential for temporary alteration of the baseflow component to surface waterbodies.

13.5.20 Where there is potential for temporary or permanent adverse impacts on groundwater quantity and quality, this may impact on nearby licensed abstractors.

Construction phase impacts that are proposed to be Scoped Out

13.5.21 The recycled water conveyance tunnel is designed to be located wholly within the London Clay and in a location where the thickness of the geology is sufficient to avoid the creation of potential pathways to the underlying aquifers. In addition, with the use of tunnelling and construction good practice guidance, the tunnel is assessed as not to have potentially significant effects on groundwater.

Operation Phase impacts that are proposed to be Scoped In

13.5.22 The presence of the Intake to TLT pipeline has the potential to alter groundwater flow paths to the superficial deposits.

Operational phase impacts that are proposed to be Scoped Out

13.5.23 The impacts on groundwater resources from operation of the Project are scoped out with the exception of flow pathways around the Intake to TLT pipeline. The Project will have no planned interaction with groundwater resources.

Flood Risk

Construction phase impacts that are proposed to be Scoped In

13.5.24 The construction phase of the Project has several potential temporary environmental impacts linked to flood risk.

13.5.25 There is a potential temporary impact on off-site developed areas by increasing flood risk through displacing floodwater elsewhere from construction materials, plant equipment and structure built above and below ground. There is also a potential temporary impact from changing surface water runoff rates and volumes by increasing the impermeable areas of the site. Whilst the land take of the Project is limited and surface water effects at each of the Project above ground sites are expected to be low a flood risk assessment report to consider these potential effects is proposed, the results of which will help inform the likely significance of these effects.

13.5.26 There is a potential temporary impact on construction works and construction workers if the site floods from rivers, watercourses or surface water.

Construction phase impacts that are proposed to be Scoped Out

13.5.27 The impacts on drainage infrastructure, including public and private assets, are scoped out. Good practice construction techniques can be used to avoid any damage to construction infrastructure through machinery, as well as providing measures to avoid increases in surface water discharge and sedimentation. These measures will be addressed in a CoCP.

13.5.28 The impacts on flood risk defences through damage from the use of construction machinery and equipment are scoped out. Appropriate construction design and adoption of a CoCP will manage and minimise this risk to a negligible level.

13.5.29 The Tudor Drive site has been assessed as low risk during the construction phase and is proposed to be scoped out of further assessment for flood risk in the EIA. The site is not hydrologically connected to any watercourses and is located over 400m away from the River Thames. The site is located in Flood Zone 1 and any water resources and flood risks occurring from the construction phase would be addressed in a CoCP, which could make recommendations relating to surface water discharged from the construction site where a temporary drainage system may be required.

13.5.30 With the exception of the River Thames at the Project's intake and outfall, there are no construction activities near[286], or in river at other sites which could affect flood risk through temporary or permanent impact on riverbed and/or bank stability. All sites other than Burnell Avenue are scoped out of consideration for flood risk through this flood risk pathway.

Operation Phase impacts that are proposed to be Scoped In

13.5.31 There are potential impacts to the Burnell Avenue site and nearby offsite developments from increased pluvial and fluvial flood risk. Permanent infrastructure and hardstanding will be constructed at Burnell Avenue within Flood Zone 2 and 3 which has potential to reduce the floodplain volume. There would also be an increase in impermeable areas, which could increase surface water runoff rates to areas on-site and offsite developments. Whilst the land take of the Project is limited and risks from fluvial and pluvial flooding at the Burnell Avenue site are expected to be low a flood risk assessment report to consider these potential effects is proposed, the results of which will help inform the likely significance of these effects.

Operational phase impacts that are proposed to be Scoped Out

13.5.32 The impacts on the flood risk of the River Thames from the discharge of water into the River Thames from the outfall are scoped out. The Project will only be operational during low flow conditions with a small discharge into the River Thames that will be the same as the abstracted volume upstream, so it will not affect flood risk.

13.5.33 Based on current design parameter for operation, the TTP would be located on top of existing storm tanks at Mogden STW in Flood Zone 1 with no increase in impermeable area and change to surface water runoff rates. The other sites are shaft locations, which are expected to only include a manhole cover with a small area of hardstanding to allow access for maintenance, so these sites are not expected to significantly alter flood risk on-site or elsewhere. Given the limited scale of the permanent infrastructure, with the

exception of Burnell Avenue, all other above ground sites are scoped out for assessment in the ES. However, Flood Risk Assessment(s) (FRAs) will be provided for any sites required by the NPPF and these will be included in the Appendix of the Environmental Statement.

13.6 Assessment Methodology

Introduction

13.6.1 This section sets out the assessment criteria specific to water resources and flood risk. The methodology will consist of the following elements:

13.6.2 An evidence-based study to describe and evaluate the existing and potential future flood risk, drainage, hydrodynamics, surface water quality (including chemicals and physico-chemical parameters such as water temperature) and groundwater quality (including sediment) baseline conditions of sensitive receptors. The evidence base will include the monitoring and surveys which was reported at Gate 2, along with the further monitoring proposed to support the environmental assessment, as detailed in Table 13.2.

13.6.3 A description of the baseline conditions for the assessment will be developed from existing EA and Thames Water monitoring data and will illustrate the variations and trends in flow, water levels, sediment characteristics and water quality temporally and spatially within the study area. This will be undertaken in tandem with the information gathered in Chapter 11 Ground Conditions and Contaminated Land, since ground conditions can be linked to water quality issues.

13.6.4 Modelling is required to further develop the understanding of the Project and to provide the evidence to support the process. The scope and scale of the modelling is uncertain at this stage; however, it will include hydrodynamic, water quality, and water temperature modelling in the freshwater Thames and the estuarine Thames Tideway. It is considered that this will incorporate the outfall velocities, draw-down and lock operation.

13.6.5 The water quality impact assessment will evaluate the future projected baseline with and without the Project against relevant water quality standards.

13.6.6 The impact assessment will consider the significance of any changes in flows, velocities, riverbed and/or bank stability of the River Thames and Thames Tideway in the study area, as potentially impacted by operation of the Project. The assessment will compare any predicted changes to hydrological standards, where available.

13.6.7 It is noted that the operational phase underwent several assessments at Gate 2 to determine the existing baseline, future baseline and Project impacts on the Water Environment. Therefore, the assessment will utilise

these Assessment Reports where appropriate to determine magnitude of effect on the water environment.

13.6.8 Additional information obtained from engagement with the stakeholders named in section 13.2 will be used to assess both the sensitivity of the receptor and the magnitude of impact. This includes the NAU, NPS, PLA, EA, LLFAs, GLA and Local Authorities.

13.6.9 The likely significant effects of the Project on the baseline conditions and future baseline conditions will be identified and understood, including the implications of changes to water resources and flood risk during both the construction and operational phases. This will include assessing the impacts of climate change on the future baseline for flood risk due to increases in peak rainfall, peak river flow and sea levels. This future baseline assessment will be undertaken in combination with the Chapter 15 Carbon and Climate Change.

13.6.10 Additional assessments will be required for some of the sites, which will be reviewed for information and included within the appendices of the PEI Report and ES. For all sites in Flood Zones 2 and 3, and sites that have an area greater than 1 ha, a FRA will be required, as stated in the NPPF. Drainage Strategies may also be required to manage surface water, which should be confirmed through consultations with the LLFA.

13.6.11 The use of Thames Water's routine modelling of water resources supply and water demand will provide the best available information on likely patterns of the Project operational periods which are available at the time.

Characterising impacts and effects

13.6.12 The impacts and effects of the Project on the water environment will be characterised and will consider those occurring during both construction and operation phases across the range of water environment receptors within the study area. Where impacts are identified, details will be provided within the assessment to characterise these in terms of:

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

Determining the sensitivity of receptors

13.6.13 The sensitivity of each identified receptor will be assessed based on the criteria set out below in Table 13.7 for hydrodynamics, geomorphology, surface water quality, surface water resources, groundwater resources, groundwater quality and flood risk.

Table 13.7 Criteria for determining the receptor sensitivity on water resources and flood risk[287]

Value/ sensitivity	Typical description	Surface water resources	Groundwater resources	Flood risk
Very high	Very high importance and rarity, international scale and very limited potential for substitution	<u>Hydrodynamics</u> • Hydrodynamics supports habitats protected/designated under EU Exit Bill <u>Geomorphology</u> • Conforms most closely to a natural, unaltered state and will often exhibit signs of free meandering and possess well-developed bedforms (point bars and pool-riffle sequences) and abundant bank side vegetation: Morph Survey Conservation Status score of 8-10 (High) • WFD hydromorphological designation 'not designated artificial or heavily modified' • Hydromorphological and/or Hydrological Supporting	<u>Groundwater resources</u> • Principal aquifer providing a regionally important resource and/or supporting a site protected under UK legislation for ecology and nature conservation • Public water supply - Groundwater Source Protection Zone (SPZ1) • Water feeding GWDTEs with a high or moderate groundwater dependence with a high environmental importance and international or national value, such as Ramsar sites, SACs, SPAs and SSSIs <u>Groundwater quality</u> • WFD waterbody with High chemical status	• Floodplain or defence protecting more than 100 residential properties from flooding • Areas which are highly vulnerable. These can include essential infrastructure, emergency services and basement dwellings

Value/ sensitivity	Typical description	Surface water resources	Groundwater resources	Flood risk
		Elements of WFD status 'High <u>Water quality</u> • WFD waterbody with 'High' status for water quality related classification elements (e.g. Physico-chemical and chemical quality elements) • Water quality supports habitats protected/designated under EU habitat legislation (e.g. Special Area of Conservation (SAC), Special Protection Area (SPA)) • Drinking Water Protected Area		
High	High importance and rarity, national scale and limited potential for substitution	<u>Hydrodynamics</u> • Hydrodynamics supports habitats protected/designated	<u>Groundwater resources</u> • Secondary A aquifers and other secondary aquifers providing a locally important resource or	• Floodplain or defence protecting between 1 and 100 residential properties or industrial premises from flooding

Value/ sensitivity	Typical description	Surface water resources	Groundwater resources	Flood risk
		under UK habitat legislation Geomorphology • Shows signs of previous alteration but still retains many natural features or may be recovering towards conditions indicative of the higher category: Morph Survey Conservation Status score of 5-7 (Moderate) • WFD hydromorphological designation 'not designated artificial or heavily modified' • Hydromorphological and/or Hydrological Supporting Elements of WFD status 'Supports Good' Water quality • WFD waterbody with 'Good' status for water quality related	supporting a river ecosystem • Public water supply - Groundwater Source Protection Zone (SPZ2) • Water feeding GWDTEs of low groundwater dependence with a high environmental importance and international or national value, such as Ramsar sites, SACs, SPAs and SSSIs; or water feeding highly or moderately GWDTE with a national non-statutory UK Biodiversity Action Plan (BAP) priority Groundwater quality • WFD waterbody with Good chemical status	• Areas which are more vulnerable. These can include hospitals, residential units, educational facilities and waste management sites

Value/ sensitivity	Typical description	Surface water resources	Groundwater resources	Flood risk
		classification elements (e.g. Physico-chemical and chemical quality elements) • Water quality supports habitats protected/designated under UK habitat legislation (e.g. Site of Special Scientific Interest (SSSI), Local Nature Reserve (LNR)		
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution	<u>Hydrodynamics</u> • Hydrodynamics supports habitats with regional interest <u>Geomorphology</u> • Substantially modified by previous engineering works and likely to possess an artificial cross-section (e.g. trapezoidal) and will probably be deficient in bedforms and bankside vegetation:	<u>Groundwater resources</u> • Aquifer providing water for agricultural or industrial use with limited connection to surface water • Public water supply - Groundwater Source Protection Zone (SPZ3) • Water feeding GWDTEs of low groundwater dependence with a national non-statutory UK BAP priority; or water	• Floodplain or defence protecting 10 or fewer industrial properties from flooding • Areas which are less vulnerable. These can include retail, commercial and general industrial units, agricultural/forestry sites and water/sewage treatment plants

Value/ sensitivity	Typical description	Surface water resources	Groundwater resources	Flood risk
		Morph Survey Conservation Status score of 2-4 (Low) • WFD hydromorphological designation 'heavily modified' • Hydromorphological and/or Hydrological Supporting Elements of WFD status 'Supports Good' <u>Water quality</u> • WFD waterbody with 'Moderate' status for water quality related classification elements (e.g. Physico-chemical and chemical quality elements)	feeding highly or moderately groundwater-dependent GWDTE sites with no conservation designation <u>Groundwater quality</u> • WFD waterbody with Moderate chemical status	
Low	Low or medium importance and rarity, local scale	<u>Hydrodynamics</u> • Hydrodynamics supports habitats with local interest <u>Geomorphology</u> • Channelised (reaches whose bed and banks are	<u>Groundwater resources</u> • Unproductive strata • Water feeding GWDTEs of low groundwater dependence with no designation or	• Floodplain with limited existing development • Water compatible development

Value/ sensitivity	Typical description	Surface water resources	Groundwater resources	Flood risk
		mostly covered by hard protection (e.g. concrete walls or sheet piling): Morph Survey Conservation Status score of 1 • Culverted (i.e. totally enclosed by hard protection): Conservation Status score of 1 • WFD hydromorphological designation 'heavily modified' or 'artificial' • Hydromorphological and/or Hydrological Supporting Elements of WFD status 'Does Not Support Good' <u>Water quality</u> • WFD waterbody with Poor status for water quality related classification elements (e.g. Physico-chemical and chemical quality elements)	groundwater that supports a wetland not classified as a GWDTE, although may receive some minor contribution from groundwater <u>Groundwater quality</u> • WFD waterbody with Poor chemical status	

Value/ sensitivity	Typical description	Surface water resources	Groundwater resources	Flood risk
Negligible	Very low importance and rarity, local scale	Hydrodynamics • Hydrodynamics regime means that the stream is dry for most of the year. Geomorphology • Reach entirely covered by hard protection; and/or completely culverted. Water quality • Non-WFD waterbody or WFD waterbody with Bad status for water quality related classification elements (e.g. Physico-chemical and chemical quality elements)	Groundwater resources • No groundwater present Groundwater quality • Non-WFD waterbody or WFD waterbody with Bad chemical status	• No flood risk receptors

Significance criteria

13.6.14 The approach to the assessment of water resources and flood risk follows the methodology described below.

13.6.15 Significance of effects will be assessed based on a combination of the magnitude of impact and the sensitivity of the receptor. Table 13.8 sets out the criteria for assessing the magnitude of impact for specific criteria for water resources and flood risk. These criteria are based on the Design Manual for Roads and Bridges[288] (DMRB) with the application of professional judgement. This guidance is considered appropriate for appraising significance of potential impacts on the water environment[289] and is therefore considered applicable to this water resources and flood risk chapter. The criteria are intended to guide professional judgement with respect to significance, but in some circumstances it may be necessary to deviate from the criteria. Any deviations will be clearly recorded and justified.

Table 13.8 Criteria for determining the magnitude of the effect on water resources and flood risk

Magnitude	Criteria	Water examples
Major	Beneficial: results in improvement of attribute and/or quality and integrity of the attribute	Removal of existing polluting discharge or removing the likelihood of polluting discharges occurring to a watercourse. Positive change to the environmental status/classification of a water feature, including water quality classification. Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring. Permanent addition of, improvement to, or restoration of physical environment; and the extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource Recharge of an aquifer. Creation of flood storage and decrease in peak flood level (> 100mm).
	Adverse: results in loss of attribute and/or quality and integrity	Permanent/irreversible damage to physical environment; and the extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource

Magnitude	Criteria	Water examples
	of the attribute	Loss of regionally important public water supply. Negative change to the environmental status/classification of a water feature, including water quality classification Extensive change to the hydrological regimes of rivers and catchments Extensive change to the geomorphological form and functioning of rivers and catchments Loss of, or extensive change to, an aquifer. Loss of regionally important water supply. Potential high risk of pollution to groundwater from routine runoff Loss of, or extensive change to GWDTE. or baseflow contribution to protected surface waterbodies. Loss or significant damage to major structures through subsidence or similar effects linked to groundwater. Increase in peak flood level (> 100mm).
Moderate	Beneficial: affects integrity of attribute, or improvement of part of attribute	Contribution to improvement in water quality that does not lead to a change in WFD status classification. Permanent addition of, improvement to, or restoration of physical environment; and the extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource Improvement in waterbody catchment abstraction management Strategy (CAMS) (or equivalent) classification. Support to significant improvements in damaged GWDTE. Creation of flood storage and decrease in peak flood level (> 50mm to 100mm).
	Adverse: affects integrity of attribute, or loss of part of attribute	Permanent/irreversible damage to physical environment; and the extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource

Magnitude	Criteria	Water examples
		Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies. Contribution to reduction in water quality that does not lead to a change in WFD status classification. Moderate changes to the hydrological regime and associated catchments Moderate changes to the geomorphological form and functioning of rivers and associated catchments Partial loss or change to an aquifer. Potential medium risk of pollution to groundwater from routine runoff - risk score 150-250. Partial loss of the integrity of GWDTE. Damage to major structures through subsidence or similar effects or loss of minor structures linked to groundwater. Increase in peak flood level (> 50mm to 100mm).
Minor	Beneficial: results in some measurable change in attribute's quality or vulnerability	Permanent addition of, improvement to, or restoration of physical environment; and the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource Reduction of groundwater hazards to existing structures. Reductions in waterlogging and groundwater flooding. Creation of flood storage and decrease in peak flood level (> 10mm to 50mm).
	adverse: Results in some measurable change in attributes, quality or vulnerability	Permanent/irreversible damage to physical environment; and the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource Minor changes to the hydrological regime and associated catchments Minor changes to the geomorphological form and functioning of rivers and associated catchment Minor effects on water supplies.

Magnitude	Criteria	Water examples
		Potential low risk of some pollution to a surface waterbody, but insufficient to cause loss in quality. Potential low risk of pollution to groundwater. Minor effects on an aquifer, GWDTEs, abstractions and structures. Increase in peak flood level (> 10mm to 50mm).
Negligible	Beneficial: affects attribute, but of insufficient magnitude to affect the use or integrity	The Project may beneficially affect the integrity of the water environment, but this is not considered measurable. No measurable impact upon an aquifer. Temporary addition of, improvement to, or restoration of physical environment; and the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
	Adverse: affects attribute, but of insufficient magnitude to affect the use or integrity	No measurable effect on the integrity of the water environment. Temporary/reversible damage to physical environment; and the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource. No measurable impact upon an aquifer and very low risk of pollution to groundwater. Negligible change in peak flood level (<10mm). Negligible change to the hydrological regime and associated catchments. Negligible changes to the geomorphological form and functioning of rivers and associated catchments.
No change	Results in no change to the receptor	The Project is not expected to have effects on the water environment. No effects on water infrastructure. No effects on flood risk.

13.6.16 The matrix in Table 13.9 below will be used to combine the magnitude of the effect and sensitivity of the receptor assessments to determine the overall significance of the effect. This classifies the overall significance of effects (beneficial or adverse). Effects which are classified as being moderate or above are considered significant effects, while slight or neutral effects are not significant.

*Table 13.9 Matrix to assess the significance of effect on water resource and flood risk receptors**

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

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

13.6.17 Cumulative effects are defined as "Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the projects"[290]. The cumulative assessment would consider baseline impact pathways that may be close to critical thresholds and where further impact could cause irreversible impacts, either as a result of other aspect areas or other proposed developments.

13.7 Mitigation

Primary

13.7.1 There is potential for adverse effects on groundwater during the construction and operation phase of the Project. These effects may be designed out through primary mitigation or be mitigated through good practice construction techniques and Thames Water operational management procedures. An example of primary mitigation could include the robust design and construction of wastewater and effluent transfer systems, limiting leakage to a negligible level, such that no significant groundwater contamination would occur.

Secondary

13.7.2 Any significant effects will be reviewed in further detail to determine the mitigation that can be used to reduce the effects in the PEI Report and ES. These measures will depend on the significance of the impact, the proposals, and the site conditions.

13.7.3 Ground investigations are currently being undertaken to obtain further details about the groundwater baseline and to inform the detailed design and mitigation measures that may be required for groundwater management during the construction and operational phases.

13.7.4 If there is potential impact to fluvial floodplain volume, floodplain compensation would be considered and form part of the design. Depending on assessment conclusions, the development and implementation of Sustainable Drainage Systems (SuDS) will be considered as further mitigation measures to control water runoff rates and volumes.

13.7.5 A Drainage Strategy may also be required to manage surface water runoff and volumes if the Project could lead to surface water flooding and/or if it is required by the LLFA. If required, this would provide a sustainable strategy for managing surface water runoff so that surface water does not flood the site or increase surface water flooding elsewhere during the operational phase.

Tertiary

13.7.6 There is potential for adverse impacts on surface waters during construction and for these to persist during the operation of the Project. Most of these risks can be addressed through good practice construction techniques and Thames Water operational management procedures and would be documented within the CoCP.

13.7.7 There is potential for adverse impacts on flood risk during construction and the operation of the Project. Most of these risks can be addressed through good practice construction techniques and Thames Water operational management procedures. For example, a CoCP is proposed to manage potential impacts on flood risk, surface water runoff, surface water and groundwater quality and quantity during the construction phase.

13.8 Summary of Scope for the EIA

13.8.1 A summary of the impacts to be scoped in or out of the ES water resources and flood risk chapter is provided in Table 13.10. This is based on the outcome of the assessment of sensitive receptors and potential environmental effects in section 13.5.

Table 13.10 Summary of the scope for water resources and flood risk

Site	Potential sensitive receptors	Potential impact	Scoped In/Out	Comment
Construction phase				
Surface Water Resources				
Burnell Avenue	Freshwater Thames	Potential hydrodynamic and geomorphological impact on channel bank and bed from in-river construction activities at intake and outfall.	IN	To be assessed through evidence-based assessments in the ES Chapter
All above ground sites with pathways to surface waters (excludes Mogden STW and Tudor Drive)	Freshwater Thames and Thames Tideway	Potential temporary impact on surface water quality from construction phase activities (e.g. dewatering and contamination).	IN	To be assessed through evidence-based assessments in the ES Chapter
Mogden STW	Duke of Northumberland's River, Freshwater Thames and Thames Tideway	Potential temporary impact on surface water quality from construction phase activities (e.g. dewatering and contamination).	OUT	The site is not hydrologically connected to any watercourses

Site	Potential sensitive receptors	Potential impact	Scoped In/Out	Comment
Tudor Drive	Freshwater Thames	Potential temporary impact on surface water quality from construction phase activities (e.g. dewatering and contamination).	OUT	The site is not hydrologically connected to any watercourses
All above ground sites	Duke of Northumberland's River, Freshwater Thames and Thames Tideway	Potential impact on water resources from water use for construction phase activities.	OUT	The construction phase of the Project will not require significant volumes of water use.
All above ground sites	Public foul sewer infrastructure	Potential impacts on public foul sewer infrastructure.	OUT	The construction phase of the Project will not discharge foul wastewater so this will not reduce the capacity contained in foul sewers.
Groundwater resources				
TLT pipeline	Principal and Secondary superficial Aquifers	Potential impact on groundwater level and alteration of baseflow component, from Intake to TLT pipeline during construction	IN	To be assessed through evidence-based assessments in the ES Chapter.

Site	Potential sensitive receptors	Potential impact	Scoped In/Out	Comment
All above and below ground sites (not including the conveyance tunnel and TLT pipeline)	Principal and Secondary superficial Aquifers	Potential impact on groundwater level, flow and quality from construction phase activities (e.g. excavation and dewatering at shaft locations)	IN	To be assessed within the ES Chapter.
Burnell Avenue	Local licensed abstractors	Potential temporary impact on groundwater quantity and quality from construction activities.	IN	To be assessed within the ES Chapter.
All above and below ground sites	Principal bedrock Aquifer	Potential impact on groundwater level and water quality from conveyance tunnel construction phase activities (e.g. excavation, dewatering, tunnelling).	OUT	Scoped out as tunnelling to be completed wholly within London Clay preventing vertical pathways to underlying aquifers.
Flood risk				
All above ground sites (except Tudor Drive)	Off-site developed areas	Increased flood risk through displacing floodwater elsewhere, changing surface water runoff rates and volumes, as well as from displacement of groundwater and alteration of groundwater flows.	IN	To be assessed within the ES Chapter accompanied by a FRA for any sites over 1ha and in Flood Zone 2 and 3, in accordance with the NPPF.

Site	Potential sensitive receptors	Potential impact	Scoped In/Out	Comment
All above ground sites	Construction works and construction workers	Potential impact if the sites flood from rivers, watercourses or surface water.	IN	To be assessed within the ES Chapter.
All above ground sites	Public foul water sewer infrastructure	Potential impacts on public foul water sewer infrastructure.	OUT	The Project will have a minimal impact on the foul water capacity of public sewers due to the construction workers since portable temporary toilets could be used. This will be addressed in a CoCP.
All above ground sites	Off-site developed areas Flood defences	Potential impacts on flood risk defences through damage from the use of construction machinery and equipment.	OUT	The Project will have a minimal impact on flood defences with all construction activities managed using good practice guidance which will be detailed with the CoCP.
Tudor Drive	Off-site developed areas	Increased flood risk through displacing floodwater elsewhere, changing surface water runoff rates and volumes.	OUT	The site is not located in a flood zone nor is it hydrologically connected to

Site	Potential sensitive receptors	Potential impact	Scoped In/Out	Comment
				any watercourses. It is located in Flood Zone 1.
All above ground sites (except Burnell Avenue)	Off-site developed areas	Potential impacts on riverbed and/or bank stability of the surrounding watercourses as a consequence of the Project.	OUT	The Project will not have riverbed or riverbank excavation/construction activities except at Burnell Avenue
Operation phase				
Surface water resources				
Burnell Avenue	River Thames	Potential impact on hydrodynamics and geomorphological processes due to abstraction at the intake and decreased river flow, both at the intake and between the intake and outfall.	IN	To be assessed through evidence-based assessment in the ES Chapter.
Burnell Avenue	River Thames	Potential impact on hydrodynamics and geomorphological processes due to input of recycled water at the outfall.	IN	To be assessed through evidence-based assessment in the ES Chapter.

Site	Potential sensitive receptors	Potential impact	Scoped In/Out	Comment
Burnell Avenue	River Thames	Potential for impact on water quality standards, underlying water chemistry and water temperature in the River Thames due to input of recycled water at the outfall.	IN	To be assessed through evidence-based assessments in the ES Chapter. Note potential consequent changes to aquatic ecology addressed in Chapter 10)
Burnell Avenue	Thames Tideway	Potential for impact on water quality standards, underlying water chemistry and water temperature in the estuarine Thames Tideway from potential change in water quality passed forward from the freshwater River Thames (as amended by input of recycled water at the outfall).	IN	To be assessed through evidence-based assessment in the ES Chapter.
Mogden STW	Thames Tideway	Potential for impact on hydrodynamics and geomorphological processes and salinity in the estuarine Thames Tideway from reductions in volume of final effluent from Mogden STW at Isleworth Ait.	IN	To be assessed through evidence-based assessment in the ES Chapter.

Site	Potential sensitive receptors	Potential impact	Scoped In/Out	Comment
Mogden STW	Thames Tideway	Potential for impact on water quality in the estuarine Thames Tideway from reductions in volume of final effluent from Mogden STW at Isleworth Ait.	IN	To be assessed through evidence-based assessment in the ES Chapter.
Burnell Avenue	Lockwood Reservoir Banbury Reservoir High Maynard Reservoir	Potential impacts on water quality at the Lockwood Reservoir, Banbury Reservoir and High Maynard Reservoir from water transfer and mixing of abstracted water from a different abstraction location on the River Thames.	OUT	Water abstracted by the Project for transfer will be similar in quality to water already transferred and will be mixed in the TLT and with existing water in Lockwood Reservoir, Banbury Reservoir and High Maynard Reservoir. This is considered to have a minimal impact on Lockwood Reservoir, Banbury Reservoir and High Maynard Reservoir water quality.
All above ground sites	Public water supply or public foul sewer infrastructure	Potential impacts on public water supply or public foul sewer infrastructure.	OUT	The operation phase of the Project will not require water use or the discharge foul wastewater so this will not

Site	Potential sensitive receptors	Potential impact	Scoped In/Out	Comment
				reduce the capacity contained in foul sewers.
All above ground sites	Off-site developed areas	Operation of the Project	OUT	Operation of the Project would have no impact on surface water resources at any of the above ground construction sites.
Groundwater resources				
Intake to TLT pipeline	Superficial Aquifers	The presence of the Intake to TLT pipeline has the potential to alter groundwater flow paths to the superficial deposits.	IN	To be assessed through evidence-based assessment in the ES Chapter.
All above and below ground sites (exception of Intake to TLT Pipeline)	All Aquifers	Operation of the Project	OUT	Operation of the Project would have no planned activities which would have interactions with groundwater
Flood risk				
Burnell Avenue	Off-site developed areas Site infrastructure	Operation of the Project	IN	To be assessed through evidence-based assessment in the ES Chapter accompanied by a FRA for

Site	Potential sensitive receptors	Potential impact	Scoped In/Out	Comment
				any sites over 1ha and in Flood Zone 2 and 3, in accordance with the NPPF.
All above ground sites (exception of Burnell Avenue)	Off-site developed areas Site infrastructure	Operation of the Project	OUT	Operation of the Project would have no impact on flood risk

14 Human Health

14.1 Introduction

14.1.1 This chapter of the Environmental Impact Assessment (EIA) Scoping Report sets out the proposed scope of EIA in relation to Human Health and should be read in conjunction with the description of the Project as presented in Chapter 2 The Project. The assessment will adopt the World Health Organization (WHO) definition of health, which is *'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'*[291]. This definition reflects that health is determined by a complex interaction between individual characteristics, lifestyle and the physical, social and economic environment. These wider determinants of health can be more important than healthcare in influencing the health of a population[292].

14.1.2 Regulation 5(2) of the Infrastructure Planning (Environmental Impact Assessment) Regulations (2017, as amended) (EIA Regulations) states that "*the EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on…population and human health*"[293] in addition to other environmental factors. It goes on to require that the Environmental Statement (ES) identify and assess the interactions between the listed environmental factors.

14.1.3 There is a significant interaction between the matters scoped within this chapter and other aspects within this EIA Scoping Report. In line with Institute of Environmental Management and Assessment (IEMA) guidance,[294] the Human Health scoping assessment considers the interaction of the social, economic and biophysical environment on population health. Matters relating to the social and/or economic environment are addressed in Chapter 12 Townscape and Visual Amenity; Chapter 16 Socioeconomic, Community, Access and Recreation and Chapter 18 Traffic and Transport. Matters relating to the biophysical environment are addressed in Chapter 6 Air Quality; Chapter 7 Noise and Vibration; Chapter 11 Ground Conditions and Contaminated Land; Chapter 13 Water Resources and Flood Risk; and Chapter 15 Carbon and Climate Change. Therefore the Human Health scoping exercise has drawn on information from these other aspect chapters where appropriate.

14.1.4 'Population' is defined as 'any group of people with shared characteristics. This could be the entire population of a defined area, or a population defined by relevant characteristics that make them more vulnerable to a proposal change, such as age or socioeconomic status'[295].

14.1.5 'Population health' refers to the health outcomes of a group of individuals, including distribution of such outcomes within the group[296]. Sub-populations which are more susceptible than the general population to certain changes in health determinants in a given context are known as 'vulnerable groups'. The Human Health assessment will identify these vulnerable groups where relevant to identify the potential for health inequalities.

14.1.6 An Equality Impact Assessment (EqIA), which will provide information in terms of groups with protected characteristics under the Equality Act 2010 and social inequalities, will be relevant for consideration of vulnerable groups and health inequalities. Equality effects will be considered in a separate EqIA which will be submitted as part of the Development Consent Order (DCO) application if significant impacts are identified at the screening stage.

14.1.7 This chapter has been prepared with reference to practice guidance set out in the(IEMA Guide to: Effective Scoping of Human Health in Environmental Impact Assessment (2022)[297] and Health Impact Assessment (HIA) in Spatial Planning (2020)[298]. In line with this guidance the ES will assess the likely significant effects from the Project on the health and wellbeing of the local population. Significant health effects are defined as '*an effect triggered by the project that is judged to be important for public health (a positive or negative effect), highly desirable for public health (a positive effect) or unacceptable for public health (a negative effect)*'[299]. The IEMA Guide to: Determining Significance for Human Health In Environmental Impact Assessment (2022)[300] will be used to guide the judgement of significance (refer to section 14.6 for information on the proposed methodology for the Human Health assessment).

14.2 Consultation and Engagement

14.2.1 Non-Statutory Public Consultation was undertaken from October 2023 to December 2023 to seek feedback about the site options for the Project from a variety of people such as landowners, residents, businesses, local authorities, and other statutory bodies who might be affected by or interested in the Project. In relation to Human Health, responses tended to be general, relaying concerns about people's quality of life, health and wellbeing particularly around the lower River Thames area.

14.2.2 On 22 July 2024, engagement was held with representatives from London Borough of Richmond upon Thames (LBR) and Royal Borough of Kingston Upon Thames (RBK), there was no representative provided by London Borough of Hounslow (LBH). The Project team outlined the baseline environment for Human Health, the proposed Human Health assessment methodology and an outline of which matters were proposed to be scoped in and which were proposed to be scoped out. During the meeting there was general agreement around the methodology presented (reflected in section 14.6) with questions

raised regarding health concerns around water quality. These matters have been considered in the assessments contained within the EIA Scoping Report.

14.2.3 No other engagements have been undertaken to date with respect to the population and human health assessment. It is proposed as part of the further assessment work that the Director of Public Health (or their representatives within local public health teams) for the relevant local authorities will be engaged alongside Local Environmental Health Officers, UK Health Security Agency and Office for Health Improvement and Disparities. Engagement with these stakeholders will assist with identification and agreement of public health priorities, the relevant determinants of health and desired health outcomes from the Project.

14.2.4 Thames Water has established a River Stakeholder Forum and reports into the pre-existing Mogden Resident group and Maidenhead to Teddington Catchment partnership. Engagement with these groups will be used to help inform the socioeconomic, community access and recreation assessment and this information will be drawn on to help provide information for the health assessment where relevant.

14.3 Legislation and Policy Review

14.3.1 The following elements from the National Policy Statement (NPS) for Water Resources Infrastructure 2023[301] are relevant to the Human Health assessment:

- Paragraphs 3.12.1 and 3.12.2 of the NPS state that *'The construction and use of water resources infrastructure has the potential to affect people's health, wellbeing and quality of life'. These paragraphs identify that infrastructure can have potential direct impacts on health because of 'traffic, noise, vibration, air quality and emissions, light pollution, community severance, dust, odour, polluting water discharges, hazardous waste and pests'* and indirect impacts *'for example if they affect access to key public services, local transport, opportunities for cycling and walking, or the use of open space for recreation and physical activity'*
- Paragraph 3.12.3 also states '*Where the proposed project has likely significant environmental impacts that would have an effect on human population or health, the applicant should identify and set out the assessment of any likely significant health impacts*'
- Paragraph 3.12.4 of the NPS notes that '*impacts may affect people in a cumulative manner'*. It states, *'The applicant, the Examining Authority and the Secretary of State (in determining an application for development consent) should consider the cumulative impact on health. The applicant should identify measures to avoid, reduce or compensate for adverse*

health impacts and seek enhancement opportunities as appropriate.' This reflects the requirements of the EIA Regulations

14.3.2 In addition to policy set out in the NPS for Water Resources Infrastructure, the Project would also have regard to the relevant key legislation, policy, standards and guidance for this aspect as listed in Table 14.1.

Table 14.1 Relevant legislation, policy and guidance

Relevant legislation, policy and guidance
Legislation
Planning Act 2008
Health and Safety at Work Act 1974
The Construction (Design and Management) Regulations 2015 (CDM Regulations)
The EIA Regulations[302]
National policy and guidance
NPS for Water Resources Infrastructure 2023[303]
The National Planning Policy Framework (NPPF) (2023) [304]. It is noted that the NPPF was under consultation until September 2024
Fair Society Healthy Lives (the Marmot Review)[305]
The Healthy Lives, Healthy People White Paper (HM Government, 2010)
Public Health England Strategy 2020-2025[306]
IEMA Guide to: Effective Scoping of Human Health in Environmental Impact Assessment (2022)[307]
IEMA Guide to: Determining Significance For Human Health In Environmental Impact Assessment (2022)[308]
Health Impact Assessment (HIA) in Spatial Planning (2020).
IEMA Guide: Competent Expert for Health Impact Assessment including Health in Environmental Assessments (2024)[309]
Regional and local plans, policies and strategies
The London Plan 2021[310]
The London Health Inequalities Strategy (2018-2028)[311]
The LBH Local Plan 2015 - 2030[312] and the LBH Local Plan 2020 - 2041 (emerging policy)
Kingston Refreshed Health and Care Plan 2022-2024[313]

Relevant legislation, policy and guidance
The LBR Local Plan 2015 - 2018[314] and the LBR 'Pre-Publication' Draft Local Plan (2024)[315]
The RBK Core Strategy 2012[316] and Kingston's Local Plan 2019 - 2041 (emerging policy)[317]
Richmond 18 Steps to Health and Wellbeing - Joint Local Health and Wellbeing Strategy 2024-2029[318]
Richmond Joint Strategic Needs Assessment[319]
Hounslow Joint Strategic Needs Assessment[320]
Hounslow Joint Health and Wellbeing Strategy 2023-2026[321]
Kingston Joint Strategic Needs Assessment 2023[322]

14.3.3 The Health and Safety at Work Act 1974 and CDM Regulations provide a framework through which work and construction related safety risks are managed, including legal obligations on employers, employees, project managers, designers and contractors to ensure risks to health are avoided or controlled to be as low as reasonably practicable. On this basis, risks to health for construction and operational workers due to safety issues are not considered relevant to the scope of EIA, as they are managed through other legislative requirements.

14.3.4 Chapter 8 of the NPPF sets out planning policy for promoting healthy and safe communities, relevantly stating that *'planning … decisions should aim to achieve healthy, inclusive and safe places'*. It identifies how access to open space and recreation is important for the health and wellbeing of communities. Consultation on proposed reform to the NPPF opened in July 2024.[323] The consultation material includes a version of the NPPF showing proposed amendments in tracked changes. Most policy in relation to promoting healthy and safe communities has remained unaltered, or negligibly changed.

14.3.5 The Marmot Review presented a robust and well-evidenced business case for national and local action to address health inequalities. It looked at the differences in health and well-being between social groups and described how the social gradient on health inequalities is reflected in the social gradient on educational attainment, employment, income and quality of neighbourhood. The scope of the health assessment has taken account of the desirability in health policy to reduce health inequalities.

14.3.6 Policy GG3 of the London Plan[324] sets out requirements for those involved in planning and development to improve Londoners' health and reduce health inequalities. This includes to *'ensure that the wider determinants of health are addressed in an integrated and co-ordinated way, taking a systematic*

approach to improving the mental and physical health of all Londoners and reducing health inequalities' and to '*assess the potential impacts of development proposals and Development Plans on the mental and physical health and wellbeing of communities, in order to mitigate any potential negative impacts, maximise potential positive impacts, and help reduce health inequalities, for example through the use of Health Impact Assessments*'. Requirements for HIA for major developments are also reflected in each of the Local Plan policies listed above. The scope of this health assessment seeks to integrate HIA into the EIA process, in line with the HIA in spatial planning guidance (2020) and paragraph 9.18 of RBK's draft Local Plan[325].

14.3.7 The London Health Inequalities Strategy[326] sets out the priorities to tackle health inequalities in London. The strategy focuses heavily on the wider determinants of health on the basis that these are the factors that lead to health inequalities. Regarding objectives for healthy communities set out in section four of the strategy, it recognises the importance of participation, empowerment and social networks in supporting health, wellbeing and social cohesion. The scope of this health assessment has considered potential impacts on social networks and participation, and how these may affect health outcomes.

14.3.8 The health and wellbeing strategies identified above have been used to help inform the preliminary baseline and health priorities. These will be further referenced, along with the relevant Joint Strategic Needs Assessments, as the EIA is progressed.

14.4 Existing Environment and Baseline Conditions

Study area

14.4.1 As noted in the IEMA health scoping guidance[327], health effects vary spatially depending on the nature of health determinants to be assessed. The following study areas as illustrated in Figure 14.1 have been applied to inform the scoping exercise:

- The EIA Scoping Boundary. This has been applied to identify the human environment within the likely physical extents of the Project. For example, this study area has helped to inform where resources used by people may be directly impacted on, for example local green spaces, and the likely population groups who interact with these resources and would potentially be affected
- The local authority areas of LBH, LBR and RBK. This study area is proposed to enable socioeconomic and public health data to be gathered for the local authority areas that would be directly affected by the footprint of the Project. It is judged to be a reasonable study area to apply

to understand the baseline local health priorities as determined by each local authority's appointed Director of Public Health, since these are set out in the respective LPA's local plans and Joint Strategic Needs Assessments (JSNAs)

- The London Water Resource Zone. The function of the Project is to protect and enhance the environment and benefit wider society[328] by increasing resilience and supply capacity for those living within the London Water Resource Zone. Therefore this study area will be applied in the assessment to capture the likely significant wider societal effects of the Project

14.4.2 The study areas applied in the chapters referenced in section 14.1 are also relevant to the human health assessment. They reflect the expected limits of likely significant effects on the various biophysical, social and economic matters which influence human health (i.e. health determinants) and which inform the scope of assessment of effects on human health.

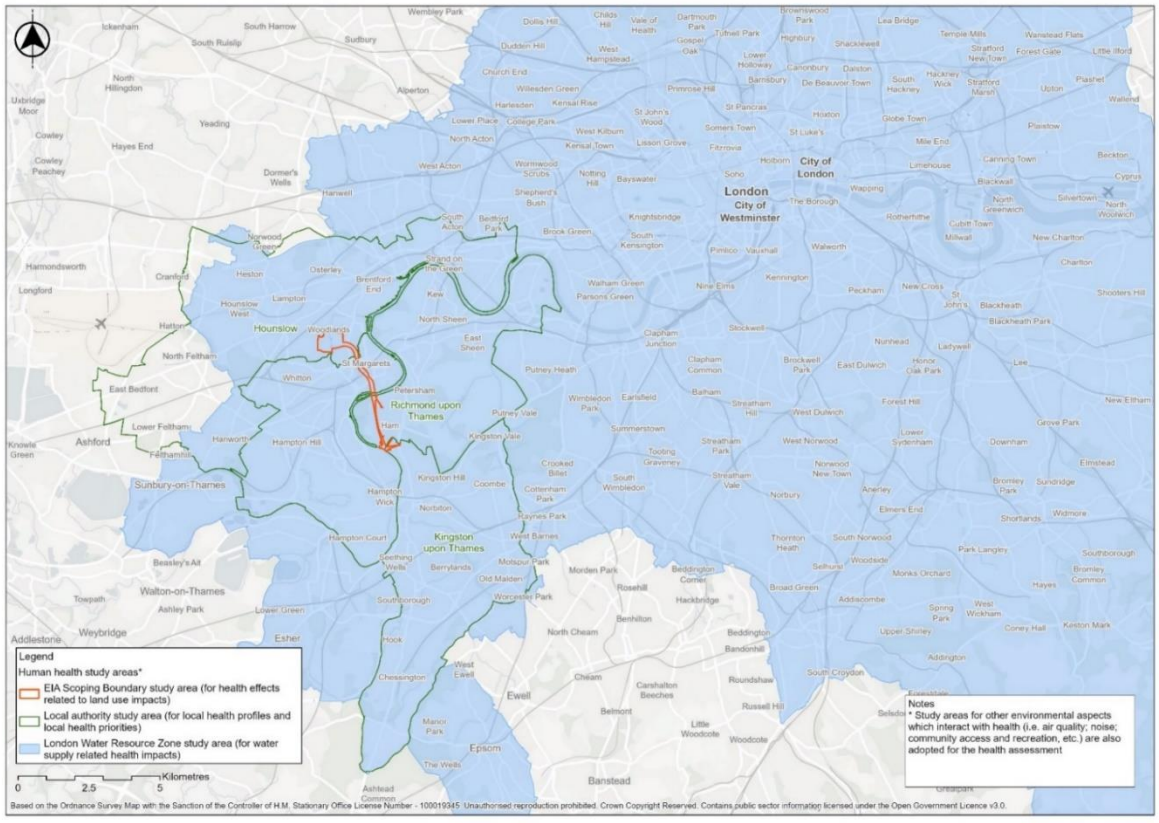


Figure 14.1 Human Health Assessment Study Areas

Recreation and social environment

14.4.3 Chapter 16 Socioeconomic, Community, Access and Recreation provides an overview of the population and settlement context of the Project. This is also of relevance to the human health context as it describes where the key residential communities are located in proximity to the Project.

14.4.4 Access to green and blue infrastructure, outdoor recreation and social networks is important for health and wellbeing, as recognised in London and local health policies identified in section 14.3. The River Thames itself provides an important recreational and community resource. This includes activities such as angling, boating, rowing, canoeing, swimming and other water sports. There are several locations for boat moorings, notably at Teddington Locks. The Thames Young Mariners is an outdoor education centre situated on the right bank of the River Thames in LBR. It is surrounded by Ham Lands, some 80 hectares of public open space. Chapter 16 provides preliminary information about the recreational and social baseline, which will be developed further as part of the scope of the Socioeconomic, Community Access and Recreation assessment.

Community and health profiles

14.4.5 Table 14.2 sets out population health indicators which have been used to characterise the health profile for the local authorities' study area of LBH, LBR and RBK.

14.4.6 Data from the 2021 National Census have been used to describe the following demographics[329]. LBH has the youngest and most ethnically diverse population, with almost 50% of its population of 288,181 reported as from a 'not white' ethnicity. Young people under the age of 15 comprise 20.6% of the population (slightly higher than RBK and LBR), while only 11.8% of the population is aged over 65 years, which is a smaller percentage than for the other boroughs in the local authorities' study area.

14.4.7 In contrast the population of LBR is characterised as being one of the least ethnically diverse amongst boroughs in London with only 19.5% of its population identifying as non-white, which aligns with the national average (19%). LBR has a population of 195,278 people, of which 16% is aged over 65 years old. This is a higher proportion than for LBH and RBK, but lower than average for England as a whole (18.3%).

14.4.8 RBK has the smallest population of any borough in London after Kensington and Chelsea with a total of 168,063 residents. Of this population, 19.5% were aged 0-15 years at the 2021 census, making Kingston the borough with the lowest proportion of children among the three boroughs of the local authorities' study area. In terms of ethnic diversity, the borough comprises

25.5% of people identifying as non-white, which is higher than the national average but substantially lower than LBH.

14.4.9 In terms of general health (age standardised proportions), LBH had the highest proportion of residents reporting good or very good health and the lowest proportion reporting bad or very bad health for the local authorities' study area. RBK also had high levels reporting good or very good health, and low levels of bad or very bad health compared to the England average (see Table 14.2). LBH had a similar general health level to average for England (see Table 14.2).

14.4.10 Based on 2021 census data, the populations of LBH, LBR and RBK are younger than average for England and with a lower proportion of residents classed as disabled under the Equality Act 2010. LBH had the same level of income deprivation as average for England (12.9%) while RBK and LBR had substantially lower levels of income deprivation (7.8% and 6.4%, respectively).

14.4.11 Health profile data were obtained from the Office for Health Improvement and Disparities (OHID) Local Health database[330] to inform this scoping exercise. Demographic data have been obtained to identify any population groups that would have a higher sensitivity to environmental changes associated with the Project compared to the average. Data relating to deaths from causes considered preventable under 75 years, deaths from coronary heart disease and deaths from stroke have been obtained because circulatory disease is the leading cause of premature death in the UK. Risk factors for circulatory disease include low levels of physical activity and therefore can be linked to the Project since the access to recreation in land and water-based facilities used for walking, equestrian activities and water sports may affect physical activity levels.

14.4.12 LBH had similar life expectancy to the average for England, while RBK and LBR both had longer life expectancy than average. RBK and LBR had lower than average death rates for heart disease, stroke and cancer, as well as lower rates of premature death from all causes. The rates for LBH tended to be closer to average for England, with the death rate for heart disease being slightly higher than average.

14.4.13 The baseline population characteristics will be developed further for the ES using more defined local area statistics to focus more specifically on the communities most likely to be impacted on by the Project. The data will also be updated where necessary to reflect any updated health data available, including that provided by local health teams for the affected boroughs.

*Table 14.2 Summary population and human health profile** [331]

Indicator	LBH	RBK	LBR	England average
Usual resident population, 2021	288,181	168,063	195,278	N/A
Population density, people per square kilometre, 2021	5,148.0	4,512.1	3,401.9	433.5
Percentage of the total resident population who are 0 to 15 years of age, 2021 (%)	20.6	19.5	20.3	18.5
Percentage of the total resident population who are 65 years and over, 2021 (%)	11.8	14.4	16.0	18.3
Population whose ethnic group is not 'white', 2021 (%)	48.6	25.5	19.5	19.0
Income deprivation, proportion of the population experiencing deprivation, 2019 (%)	12.9	7.8	6.4	12.9
Percentage of people who reported disabled under Equality Act, 2021. (%)	12.2	13.1	12.0	17.3
Life expectancy at birth for males, 2021 (years)	78.7	80.5	82.7	78.7
Life expectancy at birth for females, 2021 (years)	82.9	84.6	85.9	82.8
Percentage of population reporting general health as 'very good' or 'good', 2021	81.7	84.8	87.6	81.7
Percentage of population reporting general health as 'bad' or 'very bad', 2021	5.4	3.9	3.4	5.3
Deaths from all causes, under 75 years, Indirectly standardised ratio 2016 to 2020 (Standardised mortality ratio (SMR))	95.9	76.1	70	100.0

Indicator	LBH	RBK	LBR	England average
Deaths from coronary heart disease, all ages, Indirectly standardised ratio, 2016 to 2020 (SMR)	115.6	86.4	73.7	100.0
Deaths from stroke, all ages, Indirectly standardised ratio, 2016 to 2020 (SMR)	100.4	71.9	75.5	100.0
Deaths from all cancer, all ages, Indirectly standardised ratio, 2016 to 2020 (SMR)	86.9	82.1	81.1	100.0
Deaths from causes considered preventable, under 75 years, Indirectly standardised ratio, 2016 to 2020 (SMR)	97.1	74.7	68.2	100.0

**Source: OHID Local Health and NOMIS Census statistics*

Future baseline

14.4.14 The future baseline will likely be characterised by population growth. London is projected to grow by 434,000 people by mid-2028 compared to 2018 with a greater proportion of people aged 65 years and over[332]. This demographic trend coupled with climate change and increased risk of extreme weather would increase water demand as well as the number of people within London Water Resource Zone. This is likely to increase pressure on the healthcare system and impact access to essential services. Reference should be made to Chapter 15 Carbon and Climate Change for a description of the existing baseline regarding climate vulnerability (which includes pressure on health service) and future climate predictions.

14.4.15 Temperature increases are likely to give rise to increases in heat stress, heat stroke risk and heat-related deaths in the local population, with groups such as the elderly, young children, pregnant women, and those with ill health such as obesity particularly at risk.

14.5 Sensitive Receptors and Potential Environment Effects

Potential impact pathways on community and health

14.5.1 The Project has the potential to impact on local communities and their health through a variety of pathways. This includes potential effects on recreational land and assets (see Chapter 16 Socioeconomic, Community, Access and Recreation). There is also potential for impacts on the biophysical determinants of health (e.g. air quality and noise), which may in turn affect health. Furthermore, the perception of the Project and public concern has the potential to affect community health and mental wellbeing.

14.5.2 The scope of relevant health determinants to inform the human health assessment has been identified using the IEMA Guide to Effective Scoping of Health in EIA, with the addition of some determinants such as odour, noting that the list in the IEMA guidance is not exhaustive. Against each wider determinant scoped in, as set out in Table 14.3, a note of the communities (groups within the population) most likely to be affected, including vulnerable groups, has been provided.

14.5.3 As noted in Table 14.3, many of the wider determinants of health are interrelated. Therefore health assessment themes have been developed, as set out in Table 14.3, to allow for structuring reporting of the assessment in the forthcoming ES around these interrelated matters (see section 14.6 Assessment Methodology).

Table 14.3 Scope of population and human health assessment

Wider determinants of health		Scope according to stage		Potential effects	Health assessment themes	Relevant groups (sensitive receptors)
		Construction	Operation			
Health related behaviours. Factors pertaining to promotion of healthy behaviour and lifestyles.	Physical activity	IN	IN	The Project has potential to influence behaviours around physical activity. Parents may restrict their children's outdoor play activities due to concern over construction works in or near areas of green space (e.g. land at Ham Playing Fields and green space near Burnell Avenue). Construction may reduce local amenity in areas of green space, while concern around water quality during operation may influence swimming and other exercise associated with the River Thames. There is potential for long-lasting impacts on behaviours around physical activity. This determinant has an interaction with 'Open space, leisure and play' below.	Recreation, social participation and access to green and blue infrastructure.	Members of sports and recreation clubs. Children and young people. Recreational walkers and cyclists. Water sport participants, including wild swimmers.
	Risk taking behaviour	OUT	OUT	The project is not likely to significantly interact with factors associated with risk taking behaviours. Health and safety risks during construction are addressed through existing legislation (see section	N/A (scoped out)	N/A (scoped out)

Wider determinants of health		Scope according to stage		Potential effects	Health assessment themes	Relevant groups (sensitive receptors)
		Construction	Operation			
				14.3) while the proposal is not expected to relate to a large influx of workers. It does not relate to opportunities to address lifestyle choices such as alcohol, cigarette or drug use.		
	Diet and nutrition	OUT	OUT	While resilience of water supply is important for agriculture, the project relates more to domestic water supply and river flows in the urban environment.	N/A (scoped out)	N/A (scoped out)
Social environment. Factors pertaining to the organisation of society and promotion of social interactions to achieve safe and cohesive communities.	Housing	OUT	OUT	The Project is unlikely to influence the availability, provision or layout of housing. It is not expected to generate a large influx of workers who would place demand on housing stock.	N/A (scoped out)	N/A (scoped out)
	Relocation	OUT	OUT	The Project is not likely to entail relocation of residents.	N/A (scoped out)	N/A (scoped out)
	Open space, leisure and, play	IN	IN	Recreational routes such as the Thames Path and National Cycle Network (NCN) route 4 have the potential to be temporarily disrupted which may have indirect effects on health. Areas of green and blue space may also be disrupted during construction and (to a lesser	Recreation, social participation and access to green and blue infrastructure.	Local residents. Members of sports and recreation clubs.

Wider determinants of health		Scope according to stage		Potential effects	Health assessment themes	Relevant groups (sensitive receptors)
		Construction	Operation			
				extent) during operation which may result in a change to local play and leisure areas. During operation of the Project there is potential to affect the desire to access areas of green or blue space close to the discharge point. This determinant has an interaction with 'Physical activity' scoped above.		Users of local recreational areas, including the River Thames. Children and young people. Recreational walkers and cyclists. Tourists.
	Transport modes, access and connections	IN	OUT	The Project has the potential to temporarily affect road transport and active travel routes during construction as well as navigation on the River Thames.	Socioeconomic environment.	Local residents. Local business owners and employees. Commuters, pedestrians, cyclists. Schoolchildren and parents.
	Community safety	IN	OUT	Construction activities, particularly in areas used for recreational purposes,	Residential amenity and	Local residents.

Wider determinants of health		Scope according to stage		Potential effects	Health assessment themes	Relevant groups (sensitive receptors)
		Construction	Operation			
				may pose a health and safety risk to local residents and users. Health and safety legislation, for example the CDM Regulations (see Table 14.1), and design codes and standards, would ensure no likely significant community safety risks from the built infrastructure and operational plant and therefore community safety is scoped out for the operation stage.	community wellbeing.	Children and young people.
	Community identity, culture, resilience and influence	IN	IN	The Project has the potential to have an ongoing influence on civic pride and perceptions of the environmental quality of the River Thames. This may affect certain groups more than others such as house boat owners and participants of water sports.	Residential amenity and community wellbeing.	Local residents, including houseboats. Members of sports and recreation clubs.

Wider determinants of health		Scope according to stage		Potential effects	Health assessment themes	Relevant groups (sensitive receptors)
		Construction	Operation			
	Social participation, interaction and support	IN	IN	Community engagement and consultation on the Project has the potential to influence the degree to which people feel able to participate in decision-making, have a sense of control and able to express their views. Potential impacts on recreational assets and green and blue space may influence the ability of people to interact socially during the construction and operation stages.	Residential amenity and community wellbeing. Recreation, social participation and access to green and blue infrastructure.	Local residents. Members of sports and recreation clubs. Users of local recreational areas. Children and young people.
Economic environment. Factors pertaining to health promoting socioeconomic conditions and resources.	Education and training	IN	IN	Engagement on the Project has potential to educate communities on water use, resilience and climate change. There would be ongoing educational opportunities during operation, noting that a communication and awareness campaign is part of the implementation of the statutory Drought Plan. Construction skills are scoped in 'Employment and Income' below.	Socioeconomic environment.	Local residents. Schoolchildren.
	Employment and income	IN	IN	Land-take and loss of local amenity during construction has the potential to	Socioeconomic environment.	Local business owners and

Wider determinants of health		Scope according to stage		Potential effects	Health assessment themes	Relevant groups (sensitive receptors)
		Construction	Operation			
				impact on local businesses. Furthermore, changes in perceptions of the local environment during operation could have an impact on local business who depend on amenity and attractiveness of the River Thames corridor environment. The construction phase may offer opportunities for workforce related skills development, apprenticeships and targeted access into work for vulnerable groups.		employees. Construction workers and apprentices. Jobseekers.
Bio-physical environment. Factors pertaining to health protection to achieve healthy environmental conditions.	Climate change mitigation and adaptation	OUT	IN	The Project has potential to address resilience of water supply which is an increasingly significant issue of climate change.	Biophysical environment.	Water customers.
	Air quality	IN	OUT	Construction activities have the potential to cause dust and vehicle/combustion plant emissions which may contribute to local air pollution and loss of amenity.	Biophysical environment.	Local residents. Members of sports and recreation clubs.

Wider determinants of health		Scope according to stage		Potential effects	Health assessment themes	Relevant groups (sensitive receptors)
		Construction	Operation			
	Water quality or availability	OUT	IN	The discharge of recycled water has the potential to alter water quality (or the public perception of water quality) of the Thames downstream of outfall in both the freshwater and tidal stretches of the river which may have ongoing implications for health and wellbeing. The Project will increase resilience of water supply for the population of the London Water Resource Zone.	Biophysical environment.	Recreational users of the River Thames. Local residents. Water customers.
	Attractiveness of area and quality of built and natural environment	IN	IN	Construction activities, and the new infrastructure required, particularly at the proposed outfall and intake at Burnell Avenue, has potential to affect the quality of the built environment. This may be relating to the general layout of works and quality of visual amenity. Proposals around landscaping and Biodiversity Net Gain (see Chapter 9 Terrestrial Ecology) may also enhance the natural environment, with potential to improve health and wellbeing.	Residential amenity and community wellbeing. Recreation, social participation and access to green and blue infrastructure.	Local residents. Local business owners and employees. Recreational users of the River Thames. Users of local recreational areas. Members of sports and

Wider determinants of health		Scope according to stage		Potential effects	Health assessment themes	Relevant groups (sensitive receptors)
		Construction	Operation			
						recreation clubs.
	Land quality	IN	OUT	Chapter 11 Ground Conditions and Contaminated Land has identified potential risks to human receptors from disturbance of ground contamination during the construction phase.	Biophysical environment.	Construction workers. Local residents.
	Noise and vibration	IN	IN	Construction activities have the potential to generate noise and vibration, which could have a negative effect on ambient levels. Operation of the Project, such as pumping equipment, also has the potential to generate noise which may affect local amenity and tranquillity.	Biophysical environment.	Local residents. Local business owners and employees.
	Radiation	OUT	OUT	The Project is not of the nature to affect actual or perceived exposure to electromagnetic and ionising radiation risks.	N/A (scoped out)	N/A (scoped out).
	Odour	OUT	OUT	An odour risk assessment has been undertaken in accordance with the IAQM Odour Planning guidance[333] to assess the risk of odour from the new tertiary treatment plant (TTP), which	N/A (scoped out)	N/A (scoped out).

Wider determinants of health		Scope according to stage		Potential effects	Health assessment themes	Relevant groups (sensitive receptors)
		Construction	Operation			
				concluded the odour effect of the planned TTP as not significant. It is therefore proposed to scope out both construction and operational odour impact. Chapter 6 Air Quality addresses Odour emissions in more details.		
	Light pollution	IN	OUT	Construction activities would require temporary lighting for safety reasons when working at dusk or overnight (tunnel boring activities only), which may disturb local residents and the amenity of some recreational areas.	Biophysical environment.	Local residents. Users of local recreational areas.
Institutional and built environment. Factors pertaining to institutions for health-related care and illness prevention, other	Health and social care services	OUT	OUT	The Project is not expected to impact on provision of, or access to, health and social care services. It is not expected to result in an influx of large numbers of workers who would place a significant demand on healthcare services.	Socioeconomic environment.	N/A (scoped out)
	Built environment	OUT	OUT	The Project is not expected to influence the spatial planning and design context which influences public health. Potential impacts on the quality of built	N/A (scoped out)	Local residents. Local business owners and employees.

Wider determinants of health		Scope according to stage		Potential effects	Health assessment themes	Relevant groups (sensitive receptors)
		Construction	Operation			
organisations and systems that influence communities and wider system resources that support public health.				environment is however scoped in above under 'bio-physical environment'.		Users of local recreational areas.
	Wider societal infrastructure and resources	OUT	IN	The Project involves the provision of water infrastructure. In the operation phase, the Project will be of benefit to wider society, including the support of economic growth and water supply in the London Water Resource Zone as well as resilience to climate change. This also connects to wider issues such as the vulnerability of the water resources infrastructure to extreme weather events.	Socioeconomic environment.	Water customers.

Vulnerable groups

14.5.4 A preliminary review of the population health characteristics outlined above, with reference to the IEMA Guide to Determining Significance for Health in EIA[334], would indicate that the populations of RBK and LBR are of relatively low sensitivity due to low levels of income deprivation, good levels of health and low levels of disability. The population of LBH is indicative of medium sensitivity, with average levels of income deprivation, disability and health. However, the understanding of baseline sensitivity will be refined further as data are gathered for the specific communities likely to be affected by the proposals. Small area statistics, where available, will provide more granularity in terms of where there may be pockets of income deprivation and poor health outcomes that can be masked by borough wide data.

14.5.5 Table 14.4 provides a preliminary identification of vulnerable groups considered to be potentially more sensitive to health and wellbeing effects arising from the Project. This identification has been guided by the WHIASU Population Groups Checklist[335].

Table 14.4 Vulnerable groups potentially affected by the Project

Potentially vulnerable groups	Comment on relevance for assessment
Sex/gender related groups	
Female	Potentially more sensitive to impacts on transport modes, access and connections, and community safety. Construction impacts on use, safety or convenience of walking or cycling routes may particularly affect women who tend to have a greater perception of risks to safety. This may put them at greater risk of adverse wellbeing outcomes.
Male	This group has not been identified as being at greater risk for health outcomes that are associated with health determinants scoped into assessment in Table 14.3.
Transgender	This group may be sensitive to similar matters as set out above for females. Furthermore, transgender communities can be subjected to a greater level of victimisation which may make this group more vulnerable to adverse mental wellbeing outcomes.
Age related groups	

Potentially vulnerable groups	Comment on relevance for assessment
Children and young people	Particularly sensitive to changes in access to recreational facilities and open space, and also potentially more likely to congregate in recreational areas near where construction works are planned. Children may be more at risk in relation to community safety, particularly boys, who can be more susceptible to accidents due to a greater likelihood for bravado and horseplay[336]. Particularly vulnerable and sensitive to changes in air quality.
Older people	This group is particularly sensitive to changes in access to community facilities and may also be more susceptible to impacts of construction traffic including disruptions to public transport access. Since this group is more likely to be retired, they may spend more time at home and be more at risk to noise and disturbance affecting residential areas. Some older people are more at risk of isolation with associated sensitivity to adverse mental wellbeing outcomes. Particularly vulnerable to changes in air quality.
Groups at higher risk of discrimination or other social disadvantage	
Black and ethnic minority groups	LBH and RBK have a higher proportion of Asian or Asian British residents and Black, Black British and Caribbean and African residents than the England average. The proportion of residents who do not speak English well was higher than the average for several of these ethnic groups, and therefore they may be more likely to have difficulty accessing consultation activities and construction information. Some ethnic communities can be subjected to a greater level of victimisation which may make these groups more vulnerable to adverse mental wellbeing outcomes.
Carers	Construction impacts on road access and parking spaces may affect this group more, due to their need to visit multiple homes or to assist people with disabilities. Many carers can be more isolated than average. This may put them at greater risk of adverse wellbeing outcomes.

Potentially vulnerable groups	Comment on relevance for assessment
Ex-offenders	This group has not been identified as being at greater risk for most health outcomes that are associated with health determinants scoped into assessment in Table 14.3, however they may be more at risk of adverse mental health outcomes as a marginalised group.
Homeless	This group has not been identified as being at greater risk for most health outcomes that are associated with health determinants scoped into assessment in Table 14.3, however they may be more at risk of adverse mental health outcomes as a marginalised group.
Lesbian, gay and bisexual people	
People seeking asylum	
People with long term health conditions	Potentially more sensitive to changes in multiple health determinants including access to open space and recreational facilities, noise and air quality and access to community facilities.
People with mental health conditions	
People with physical, sensory or learning disabilities/difficulties	
Refugee groups	Potentially more sensitive to construction noise and lighting impacts due to poor mental health and associations with past traumatic experiences of conflict.
Religious groups	There is some limited evidence that certain faith groups are less supportive of potable water reuse schemes than other groups[337], which could lead to increased risk of negative effects on mental wellbeing or mental health for these groups.
Lone parent families	This group has not been identified as being at greater risk of poor health outcomes that are associated with health determinants scoped into assessment in Table 14.3.
Veterans	
Income related groups	
Economically inactive	This group has not been identified as being at greater risk of poor health outcomes that are associated with health determinants scoped into assessment in Table 14.3.
People on low income	

Potentially vulnerable groups	Comment on relevance for assessment
People who are unable to work due to ill health	Potentially more sensitive to changes in multiple health determinants including access to open space and recreational facilities, noise and air quality and access to community facilities.
Unemployed/workless	Potentially more likely to benefit from job creation and skills development associated with construction of new infrastructure in a local area.
Geographical groups and/or settings	
People who work in key settings: workplaces/schools/hospitals/care homes/prisons	Construction impacts on road access and parking spaces may affect these groups more, depending on their needs to visit multiple locations or the proximity of certain settings and any likely disruptions to access.
People living in areas which exhibit poor economic and/or health indicators	Potentially more sensitive to changes in multiple health determinants including access to open space and recreational facilities, noise and air quality and access to community facilities.
People living in rural, isolated or overpopulated areas	These groups have not been identified as being at greater risk of poor health outcomes that are associated with health determinants scoped into assessment in Table 14.3.

14.6 Assessment Methodology

Assessment approach

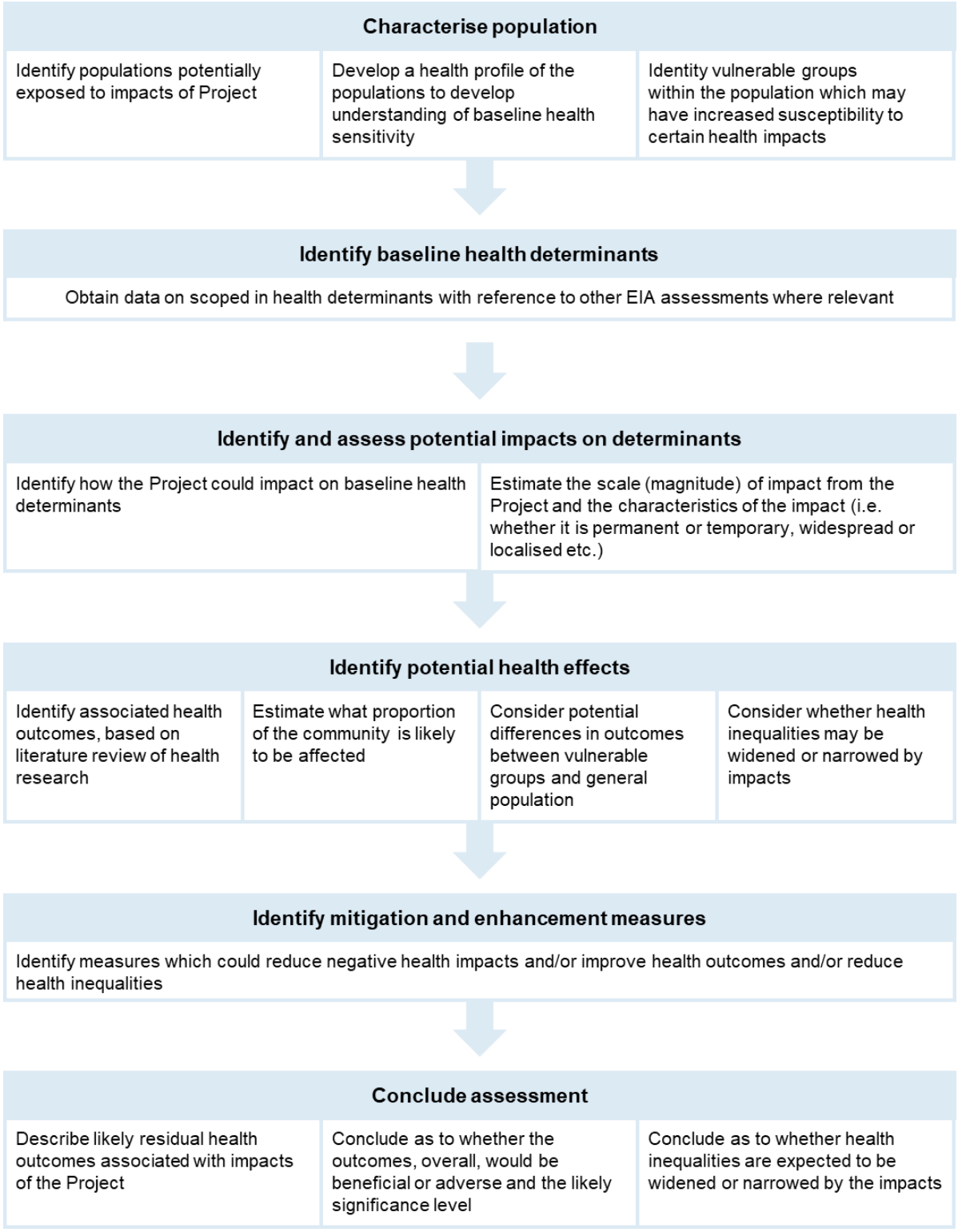
14.6.1 It is proposed to undertake a comprehensive HIA fully integrated into the EIA process to meet requirements of the EIA Regulations. The overall approach to the Human Health assessment will follow the key steps set out in Figure 14.2. The HIA will be reported as part of the chapter on human health in the forthcoming ES.

14.6.2 For the assessment methodology, potential long-term impacts on people from pre-application activities and consenting, such as consultation and engagement, will be incorporated into the construction stage due to the interrelation between such impacts and the construction methodology.

14.6.3 Regulatory standards in England and local health priorities will be considered within the assessment process. Human Health based standards for environmental determinants such as air pollution, land contamination and noise will also be considered to inform judgements of significance to Human Health.

14.6.4 The assessment of human health will be undertaken based on guidance provided in IEMA Guide to: Determining Significance for Human Health in Environmental Impact Assessment (2022)[338] .

14.6.5 The assessment will take account of findings from the EqIA (subject to whether an EqIA is screened in as required) which may provide information of relevance to vulnerable groups and health inequalities in terms of groups with protected characteristics under the Equality Act 2010.



Source: Author's own

*Figure 14.2 Human Health Assessment Methodology**

Consultation and participation

14.6.6 A core principle of HIA is that it should be participatory and therefore the health assessment will draw upon surveys of community and recreational groups as proposed in Chapter 16 Socioeconomic, Community, Access and Recreation, as well as engage with local authority public health teams to help steer the health assessment. Local authority public health teams will be consulted for information and advice on local health matters and the local health profiles will be updated and developed to better understand the sensitivity of population groups likely to be affected by the Project.

Health literature review

14.6.7 A health literature review will be undertaken to identify the strength of evidence for associations between effects on various determinants of health and health outcomes. The issues targeted for the literature review will relate to the mapping out of potential health impact pathways identified above in Table 14.3. The literature review will not be exhaustive but will aim to present the current scientific consensus on links between health determinants and health outcomes in relation to developments similar to the Project. The review will consider whether the available research is likely to be generalisable to the populations in the study area for the Project. The literature review will be important in supporting the assessment of significance with the best available evidence.

Health assessment themes

14.6.8 As indicated in Table 14.3, many of the health determinants (matters) scoped using the IEMA guidance are interrelated. It is therefore proposed to structure the reporting of the assessment matters under health assessment themes as follows.

- Recreation, social participation and access to green and blue infrastructure
  - physical activity
  - open space, leisure and play
  - social participation, interaction and support, and
  - attractiveness of area and quality of natural environment
- Residential amenity and community wellbeing
  - community safety
  - community identity, culture, resilience and influence
  - social participation, interaction and support
  - built environment, and
  - attractiveness of area and quality of built environment.

- Biophysical environment
  - climate change mitigation and adaptation
  - air quality
  - water quality or availability
  - land quality
  - noise and vibration, and
  - light pollution
- Socioeconomic environment
  - education and training
  - employment and income
  - wider societal infrastructure and resources, and
  - transport modes, access and connections

14.6.9 The HIA will assess the likely health outcomes based on the determinants of health alongside the site-specific and local conditions relevant to health and wellbeing. The assessment will incorporate an impact pathway model to determine the likely significant effects of the Project on health outcomes. An impact pathway will be considered possible where there is potential for a pathway between an impact and a likely health and wellbeing outcome. Assessments will be primarily desk-based, using publicly available data sourced from governmental, non-governmental and scientific literature.

14.6.10 The assessment of effects of the Project on health outcomes will apply significance in terms of impacts on 'population health', which means the impact on the health of groups of people rather than the health of specific individuals. The assessment will consider the distribution of potential impacts and whether there is a likelihood of increasing or reducing health inequalities.

14.6.11 The approach to the assessment relating to each of these health assessment themes is described further below.

Recreation, social participation and access to green and blue space

14.6.12 For the land use related impacts such as impacts on open space and access, reference will be made to the baseline information set out for the Socioeconomic, Community Access and Recreation assessment (see Chapter 16).

14.6.13 Pathways to potential health and wellbeing outcomes associated with impacts on land use, recreation and access will be reported and the significance assessed using the IEMA guidance and drawing on evidence from the literature review. The assessment will consider whether there are likely to be vulnerable groups that may be more susceptible to those impacts.

14.6.14 The assessment will be informed by targeted consultation of relevant community, business and recreation stakeholders to be undertaken as part of the Socioeconomic, Community Access and Recreation assessment scope (see Chapter 16).

Residential amenity and community wellbeing

14.6.15 Chapter 16 sets out the proposed scope and method of assessment of impacts on residential amenity.

14.6.16 Some of the wider determinants scoped in relate to issues such as community identity, culture, resilience and influence and social participation. A qualitative assessment is proposed to make use of results of public engagement and consultation and targeted consultation of specific affected groups as set out in Chapter 16. The assessment will seek to identify if there are particular communities who indicate a greater strength of feeling or concern and will consider the baseline sensitivity and nature of potential impacts on these communities. It is proposed to use the Mental Wellbeing Toolkit[339] to help systematically address protective factors for mental wellbeing.

Biophysical environment

14.6.17 For impacts related to factors such as air quality, noise, visual amenity and water quality, the results from relevant technical assessments scoped into the ES will be used to identify the impacts. Pathways to potential health outcomes associated with impacts on biophysical factors, informed by the health literature review, will be reported and the significance assessed using the IEMA guidance. The assessment will consider whether there are likely to be vulnerable groups that may be more susceptible to those impacts.

Socioeconomic environment

14.6.18 Chapter 16 sets out the proposed methodology for the assessment of socioeconomic impacts. The human health assessment will take the findings of that assessment and consider the likely significance of those effects in terms of population health. Pathways to potential health outcomes associated with socioeconomic effects, informed by the health literature review, will be reported and the significance assessed using the IEMA guidance. The assessment will consider whether there are likely to be vulnerable groups that may be more susceptible to those impacts.

Determining the sensitivity of receptors

14.6.19 The determination of sensitivity for the population groups likely to be affected will be guided by the IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment[340]. Based on this guidance, the judgement of sensitivity involves the consideration of several factors such as deprivation levels, health profile, inequalities, levels of dependency and community outlook (for example, if there is widespread public concern); as shown in Table 14.5.

*Table 14.5 Health sensitivity criteria**

Category/ level	Indicative criteria**. The narrative explains that the population or sub-population's sensitivity is driven by (select as appropriate):
High	High levels of deprivation (including pockets of deprivation); reliance on resources shared (between the population and the project); existing wide inequalities between the most and least healthy; a community whose outlook is predominantly anxiety or concern; people who are prevented from undertaking daily activities; dependants; people with very poor health status; and/or people with a very low capacity to adapt
Medium	Moderate levels of deprivation; few alternatives to shared resources; existing widening inequalities between the most and least healthy; a community whose outlook is predominantly uncertainty with some concern; people who are highly limited from undertaking daily activities; people providing or requiring a lot of care; people with poor health status; and/or people with a limited capacity to adapt
Low	Low levels of deprivation; many alternatives to shared resources; existing narrowing inequalities between the most and least healthy; a community whose outlook is predominantly ambivalence with some concern; people who are slightly limited from undertaking daily activities; people providing or requiring some care; people with fair health status; and/or people with a high capacity to adapt
Very low	Very low levels of deprivation; no shared resources; existing narrow inequalities between the most and least healthy; a community whose outlook is predominantly support with some concern; people who are not limited from undertaking daily activities; people who are independent (not a carer or dependant); people with good health status; and/or people with a very high capacity to adapt
**Note: Judgement based on most relevant criteria, it is likely in any given analysis that some criteria will span categories.	

**Source: IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment*

Determining magnitude of impact

14.6.20 The determination of magnitude will be guided by the IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment; as shown in Table 14.6. Determining magnitude requires a judgement on the likely level of exposure, duration and frequency of an impact on a health determinant. It also considers the severity of the health outcome, for example, whether associated outcomes relate to a change in mortality, morbidity, or quality of life. Reversibility of the associated health outcomes is also considered.

*Table 14.6 Health Magnitude Methodology Criteria**

Category/ Level	Indicative criteria**. The narrative explains that the population or sub-population's magnitude of change due to the project is driven by (select as appropriate):
High	High exposure or scale; long-term duration; continuous frequency; severity predominantly related to mortality or changes in morbidity (physical or mental health) for very severe illness/injury outcomes; majority of population affected; permanent change; substantial service quality implications
Medium	Low exposure or medium scale; medium-term duration; frequent events; severity predominantly related to moderate changes in morbidity or major change in quality-of-life; large minority of population affected; gradual reversal; small service quality implications
Low	Very low exposure or small scale; short-term duration; occasional events; severity predominantly related to minor change in morbidity or moderate change in quality-of-life; small minority of population affected; rapid reversal; slight service quality implications
Negligible	Negligible exposure or scale; very short-term duration; one-off frequency; severity predominantly relates to a minor change in quality-of-life; very few people affected; immediate reversal once activity complete; no service quality implication
**Note: Judgement based on most relevant criteria, it is likely in any given analysis that some criteria will span categories.	

**Source: IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment*

Determining Significance

14.6.21 The significance of health effects will be assessed for residual effects (i.e. after taking into account the application of mitigation measures). The determination of significance in the health assessment will involve professional judgement guided by the IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment, using the significance matrix in Table 14.7. The IEMA Guidance states the following:

'The matrix is only a tool to assist with judgement, there are not clear cut-off points between categories and terminologies, for example the point at which an impact changes magnitude category is a professional judgement and should be supported by evidence and justification.'

*Table 14.7 EIA Significance Matrix**

		Sensitivity			
		High	Medium	Low	Very Low
Magnitude	High	Major	Major/ Moderate	Moderate/ Minor	Minor/ Negligible
	Medium	Major/ Moderate	Moderate	Minor	Minor/ Negligible
	Low	Moderate/ Minor	Minor	Minor	Negligible
	Negligible	Minor/ Negligible	Minor/ Negligible	Negligible	Negligible

Source: (Pyper, 2022b)

14.6.22 The judgement will be supported with a narrative, that will include the consideration of a range of information such as:

- Scientific literature
- Baseline conditions for the population
- Health priorities in the study area
- Consultation undertaken
- Regulatory standards in England and health policy context in the study area and England

14.6.23 Effects assessed as Moderate or Major significance will be considered significant.

Impact interactions

14.6.24 There is a likelihood that some communities may be affected by multiple impact pathways, for example a combination of noise, traffic disruption and land-take during construction. A spatial analysis of the identified impacts will be undertaken to look for geographical areas of overlap. There is no specific guidance on addressing impact interactions for population and human health. Furthermore, evidence of health outcomes tends to relate to research into single risk factors and pathways, rather than interactions. Therefore, professional judgement will be applied in interpreting the health evidence and considering the nature of potential effects and sensitivity of the relevant receptors will then be assessed to inform a qualitative and reasoned judgement of significance.

14.7 Mitigation

14.7.1 The Project has sought to avoid direct impacts on human health and wellbeing by selecting shafts, intake and outfall locations that are not in close proximity of human receptors. Chapter 3 Design Evolution provides further information on this. However, given the built-up nature of the surrounding area, impacts on some areas of open space used by the community are likely to be unavoidable. The human health assessment process would help to identify suitable mitigation for adverse effects on health and wellbeing. Opportunities for enhancing the potential to improve the health and wellbeing of the local community in line with local policies and strategies will be considered where appropriate.

14.8 Summary of Scope for the EIA

14.8.1 This scoping section has considered the determinants of health outlined in IEMA guidance, in relation to the likely impacts of the Project during both construction and operation. The findings are set out in Table 14.3 which provides the rationale as to why particular wider determinants have been scoped in or scoped out.

14.8.2 It is proposed to present the human health assessment under four themes to reflect the different pathways through which the Project has the potential to affect these wider determinants of health. The proposed scope of human health assessment themes and wider determinants to be included in the ES is set out below in Table 14.8.

Table 14.8 Summary of the scope for Human Health

Health assessment theme	Relevant determinants of health	Potential sensitive receptors	Potential impact pathways	Scoped In/Out	
				Construction	Operation
Recreation, social participation and access to green and blue infrastructure	Physical activity. Open space, leisure and, play. Social participation, interaction and support. Attractiveness of area and quality of natural environment.	Local residents. Members of sports and recreation clubs. Users of local recreational areas including users of the River Thames. Recreational walkers and cyclists. Tourists. Children and young people.	Potential temporary and permanent land-take from some areas of green space, including recreation grounds (e.g. land at Ham Playing Fields and green space near Burnell Avenue). Potential temporary impacts on access to areas of recreation, leisure and tourism during construction. Potential diversions of Thames Path and NCN route 4 during construction. Potential temporary and/or permanent loss of amenity to some areas of green and blue space during construction and operation. Potential impacts on visual amenity and quality of environment due to construction, layout, landscaping and Biodiversity Net Gain proposals. Potential reduction in enjoyment and use of River Thames for recreational activities	IN	IN

Health assessment theme	Relevant determinants of health	Potential sensitive receptors	Potential impact pathways	Scoped In/Out	
				Construction	Operation
			due to concern for water quality during operation.		
Residential amenity and community wellbeing	Community safety. Community identity, culture, resilience and influence. Social participation, interaction and support. Built environment. Attractiveness of area and quality of built environment.	Local residents including houseboats. Children and young people.	Potential temporary loss of amenity in residential areas close to the Project during construction. Potential impacts on protective factors for mental wellbeing during design and construction phases of Project (control, resilience/community assets, participation and inclusion). Potential hazards from construction activities which may pose safety risks to general public.	IN	IN
Biophysical environment	Climate change mitigation and adaptation. Air quality. Water quality or availability. Land quality. Noise and vibration.	Local residents. Local business owners and employees. Members of sports and recreation clubs.	Potential air quality and noise and vibration impacts from vehicle and plant emissions during construction. Potential disturbance of ground contamination during construction. Potential impacts of dust from construction activities, for example excavation works.	IN	IN

Health assessment theme	Relevant determinants of health	Potential sensitive receptors	Potential impact pathways	Scoped In/Out	
				Construction	Operation
	Light pollution .	Water customers in the water resource zone.	Potential positive impacts on climate and drought resilience from the project during operation. Potential impacts on water quality from proposed outfall during operation.		
Socioeconomic environment	Education and training. Employment and income. Wider societal infrastructure and resources. Transport modes, access and connections.	Local residents. Jobseekers. Local business owners and employees. Children and young people. Water customers.	Potential to provide employment and skills opportunities during construction. Potential to educate communities on water use, resilience and climate change through engagement events. Potential disruption to utilities and transport routes during construction. Potential benefits to customers from water supply infrastructure.	IN	IN

15 Carbon and Climate Change

15.1 Introduction

15.1.1 This chapter sets out the proposed scope of the Environmental Impact Assessment (EIA) in relation to Climate Change and should be read in conjunction with the description of the Project as presented in Chapter 2 The Project.

15.1.2 Regulation 5(2) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017(the EIA Regulations) states that "*the EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on…climate*"[341]. Within Schedule 4 of the EIA Regulations, it goes on to require that the Environmental Statement (ES) must include:

"A description of the likely significant effects of the development on the environment resulting from … the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change…"

15.1.3 In line with this, the ES will assess the likely significant effects of:

- Emissions of greenhouse gasses[342] associated with the Project (i.e., the impact of the Project on climate)
- Climate change related impacts on the Project (i.e. the vulnerability of the Project to climate change)

15.1.4 The 'in-combination' effects from climate change (i.e. where possible future changes in climate have the potential to exacerbate or conversely diminish the effect of an existing impact of the Project) are considered in this chapter (see section 15.6).

15.1.5 Potential flood risk impacts will be considered in Chapter 13 Water Resources and Flood Risk. The assessment will incorporate allowances for future climate change to determine flood risk impacts on receptors within the study area that is assessed for that aspect.

15.1.6 The carbon and climate change aspects are both considered within this EIA Scoping Report chapter. It is anticipated that these may be assessed within separate chapters in the ES.

15.2 Consultation and Engagement

15.2.1 Non-Statutory Public Consultation was undertaken from October 2023 to December 2023 to seek feedback about the site options for the Project from variety of people such as landowners, residents, businesses, local authorities, and other statutory bodies who might be affected by or

interested in the Project. In relation to carbon and climate change, issues raised were related to carbon emissions during construction and operation phases of the Project and consequence impacts to the climate.

15.2.2 On 26 July 2024, a pre-application meeting was held with representatives from London Borough of Hounslow (LBH), London Borough of Richmond upon Thames (LBR) and Royal Borough of Kingston Upon Thames (RBK) via video link. The Project team outlined the baseline environment in relation to carbon and climate change and proposed assessment methodology. Comments or questions during the meeting included queries around project alternatives, use of pumps and Project utilisation with responses provided including information on the maintenance flow requirements for the tertiary treatment plant as set out in Chapter 2 The Project. A query was also raised as to whether resource efficiency/circular economy principles would be followed, and it was confirmed that they would be, where practicable to do so, as set out in Chapter 17 Waste and Materials.

15.3 Legislation and Policy Review

15.3.1 The legislation key policy, standards and guidance which were considered in the carbon and climate change scoping assessment for the Project are listed in Table 15.1.

15.3.2 Key policy relevant to carbon and vulnerability to climate change are set out in the National Policy Statement (NPS) for Water Resources Infrastructure[343]. Section 4.4 of the NPS for Water Resources Infrastructure provides guidance on the assessments and planning requirements that the applicant should meet with respect to greenhouse gas emissions and climate change mitigation and includes:

- The potential impact and sources of greenhouse gasses, and the overarching UK government commitments and targets relating to net zero and carbon reduction
- The components of the assessment of greenhouse gas emissions to be included in the ES
- Advice on the identification of appropriate mitigation measures and determining the significance of effects
- The decision-making process, based on the Project's emissions compared to national carbon budgets and Nationally Determined Contribution, with greenhouse gas emissions to be reduced to as low as reasonably practical and proposed offsetting of emissions, where significant emissions are identified

15.3.3 Section 3.7 of the NPS for Water Resources Infrastructure provides guidance on how the applicant, and Secretary of State (SoS) when determining an application, should implement climate change adaption into nationally

significant infrastructure project applications and take into account the effects of climate change. It includes:

- Confirmation that the ES must include consideration of the vulnerability of the Project to climate change at the design, build and operational stages
- A summary of the types of climate change impacts which may be expected
- Advice on the climate projection scenarios to be considered when developing adaptation measures, including the scenarios for considering safety critical elements of infrastructure projects

15.3.4 In 2019, Thames Water along with other water companies in England, pledged for operational emissions to be net zero by 2030[344]. Thames Water set out its roadmap to net zero in June 2021[345] which includes targets of net zero operational carbon by 2030. This is consistent with the Net Zero 2030 Routemap developed by Water UK, the trade association for the water industry. The Price Review 2024 (PR24) methodology developed by The Water Services Regulation Authority (Ofwat) also includes requirements for water companies to reduce greenhouse gas emissions for the period 2025 – 2030[346].

15.3.5 Thames Water submitted its climate adaptation report to the Department for Environment, Food and Rural Affairs (Defra) in 2021[347] under the Adaptation Reporting Power of The Climate Change Act 2008. The report identifies the challenges of climate change on Thames Water's operations and how it is addressing these risks to become more resilient.

Table 15.1 Relevant legislation, policy and guidance

Relevant legislation, policy and guidance
Legislation
Climate Change Act 2008 (as amended)
National policy
United Kingdom of Great Britain and Northern Ireland's Nationally Determined Contribution[348]
NPS for Water Resources Infrastructure 2023[349]
The National Planning Policy Framework (NPPF) 2023[350]. It is noted that the NPPF (2024) was under consultation until September 2024
Third National Adaptation Programme (NAP3)[351]
Regional and local policy
The London Plan 2021[352]

Relevant legislation, policy and guidance
The LBH Local Plan 2015 - 2030[353] and the LBH Local Plan 2020 - 2041 (emerging policy)
The LBR Local Plan 2015 - 2018[354] and the LBR 'Pre-Publication' Draft Local Plan (2024) [355]
The RBK Core Strategy 2012[356] and Kingston's Local Plan 2019 - 2041 (emerging policy)[357]
Thames Water and water industry policy
Net Zero 2030 Routemap[358]
Our Journey to Net Zero and Beyond[359]
The Price Review 2024 (PR24)[360]
Protecting our water and world, Our Climate Change Adaptation Report for 2015-2020[361]
Guidance
PAS 2080:2023 Carbon Management in Buildings and Infrastructure[362]
Whole life carbon assessment for the built environment[363]
BS EN 15978 Sustainability of construction works[364]
Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance, 2nd Edition[365]
Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation[366]

15.4 Existing Environment and Baseline Conditions

Study Area

Greenhouse gases

15.4.1 For greenhouse gasses, the receptor is the global climate as all emissions, regardless of where they occur, contribute to the concentration of greenhouse gasses in the atmosphere and associated global warming. As such, the following study areas are defined for the emission sources which would be considered within this assessment:

- The greenhouse gas emissions resulting from construction – this is the study area necessary to consider all of the greenhouse gas emissions embodied within construction materials (i.e. greenhouse gasses generated during the manufacture of raw materials) and their associated transport to site from the supplier. It also includes greenhouse gas

emissions associated with construction activities carried out within the EIA Scoping Boundary and those associated with workers travelling to and from the construction site and the transport and processing of waste offsite for reuse, recycling, treatment, or disposal. As such, the study area is defined by the greatest extent of these activities, some of which, it is assumed, may occur at a national scale (i.e. within the United Kingdom)

- The greenhouse gas emissions resulting from operation and maintenance – the study area is based on a similar extent as the construction phase (e.g. to include replacement of assets which may be delivered from suppliers located across the United Kingdom). It also includes the greenhouse gas emissions from the energy consumed within the EIA Scoping Boundary required to operate the Project and greenhouse gas emissions from any on-site combustion sources or processes associated with the operation of the Project

Vulnerability

15.4.2 For the climate vulnerability assessment potential sensitive receptors during the construction phase include on-site construction workers, equipment and excavations and during the operational phase, the infrastructure assets which form part of the Project (including physical infrastructure and machinery).

15.4.3 As such, the study area for the assessment of the vulnerability of the Project to climate change comprises the EIA Scoping Boundary of the Project, including compounds and land required for the construction of the Project.

Baseline conditions

Greenhouse gases

Existing baseline

15.4.4 In 2021, UK net greenhouse gas emissions were estimated at 427 million tonnes of carbon dioxide equivalent ($MtCO_2e$), with the water supply and sewerage sector (including natural water, water treatment and supply services, sewerage services and sewage sludge) estimated to have accounted for approximately 3.6 $MtCO_2e$ (i.e. approximately 0.84% of this total)[367].

15.4.5 Thames Water's net operational emissions for the financial year 2023/24 were 350.4 thousand tonnes of carbon dioxide equivalent ($ktCO_2e$)[368,369].

Future baseline

15.4.6 Future baseline greenhouse gas emissions relevant to the Project will be defined by the five-yearly UK carbon budgets that have been set to date (and which define the UK's planned trajectory to net zero) as well as Thames Water's pledge to achieve net zero operational carbon emissions by 2030.

15.4.7 The UK Government carbon budgets which have been set to-date and that are relevant to the Project are as follows:

- The fourth carbon budget: 2023–2027 (defined within The Carbon Budget Order 2011) – 1,950 $MtCO_2e$, equivalent to a 36% reduction in annual emissions from a 1990 baseline
- The fifth carbon budget: 2028–2032 (defined within The Carbon Budget Order 2016) – 1,725$MtCO_2e$, equivalent to a 57% reduction in annual emissions from a 1990 baseline
- The sixth carbon budget: 2033–2037 (defined within The Carbon Budget Order 2021) – 965$MtCO_2e$, equivalent to a 78% reduction in annual emissions from a 1990 baseline. It is also the first budget which is in line with the 2050 net zero carbon target

Vulnerability

Existing baseline

15.4.8 The existing climate in Southern England and London can be subject to continental weather influences bringing cold spells in winter and hot, humid weather in the summer. This location being furthest from the paths of most Atlantic depressions, which commonly bring cloud, wind and rain to the UK. The mean annual temperatures in London are approximately 11.5°C, typically higher than other regions of the UK. There are strong seasonal variations in temperature for London with mean daily minimum temperatures in January reaching 3°C and mean daily maximum temperatures in July reaching 23.5°C, the highest in the UK.

15.4.9 A prominent feature of the London climate is the urban heat-island effect caused by the fabric of buildings retaining heat from daytime insolation which commonly results in temperatures in central London being 5°C above that of the outer suburbs and rural areas. This is particularly prominent during extreme heat waves. For example, in July 2022, London hit 40°C. During that heatwave, the London Fire Brigade received 2,496 calls, including 740 relating to wildfires, and operations were cancelled at Guy's and St Thomas' hospitals as IT servers broke down in record heat. The East Coast mainline was disconnected from King's Cross as trainlines buckled and overhead lines sagged[370].

15.4.10 Rainfall in Southern England is associated with convection or Atlantic depressions. The Atlantic lows are strong in the autumn and winter, bringing the majority of rain during these months. During the summer, convection

from solar surface heating forms rain clouds and consequent thunderstorms. The heat from London's heavily urbanised area can encourage shower development during the summer. Typically, the London region receives less than 650mm per year. For context, the driest regions in Eastern England total around 500mm/year and there is over 4,000mm/year in the western Scottish Highlands. Southern England and London are susceptible to summer thunderstorms and consequently flooding from intense rainfall. For example, in July 2021, London was hit by two extreme rainstorms. Some parts of the city received more than twice the average July rainfall in two hours, causing major disruption and over 2,000 properties flooded with stormwater and sewage. The region can be subject to dry periods putting water resources under increased pressure. If a period with below average rainfall includes winter months as well as the high-demand summer months, then conditions can become severe as the winter is the normal recharge time not only for reservoirs but the chalk aquifers upon which much of the region relies for water supplies. Examples include the period November 2004 to February 2006, when about 75% of the normal rainfall occurred over the area, making it the driest such period since 1932/34[371].

15.4.11 Information presented in section 13.4 of Chapter 13 Water Resources and Flood Risk suggests that elements of the Project are located in areas with a high risk of river and groundwater flooding and a medium risk of surface water flooding, suggesting the Project is potentially vulnerable to flooding.

15.4.12 London is especially vulnerable to subsidence due to its clay rich soil, its density of infrastructure and buildings and high exposure to heat and drought. The British Geological Survey says this problem is exacerbated by climate change. No records were available at the time of writing regarding past incidences of subsidence within the footprint of the Project.

Future baseline

15.4.13 Future climate change scenarios for the UK have been modelled by the Met Office. The most recent projections, the UK Climate Projections 2018, are referred to as UKCP18, which project general trends of climate change towards warmer, wetter winters and hotter, drier summers[372].

15.4.14 UKCP18 uses scenarios for future greenhouse gases called representative concentration pathways (RCPs), which cover a range of assumptions around future population, economic development and include the possibility of mitigation of greenhouse gas emissions towards international targets. The RCPs are expressed for future radiative forcing targets of 2.6, 4.5, 6.0 and 8.5 watts per square metre (W m^2) in 2100 (RCP2.6, RCP4.5, RCP6.0 and RCP8.5 pathways). Each pathway drives a different range of projected global mean temperature increases over the 21 century, taking account of uncertainty in aspects such as the transient climate response and rate of ocean heat uptake.

15.4.15 The RCP pathways lead to a broad range of climate outcomes but are neither forecasts nor policy recommendations. RCP2.6 represents a scenario where there are sizeable reductions in emissions of greenhouse gases. This scenario gives a reasonable chance of limiting global average warming to between 1.5 and 2°C above pre-industrial levels. RCP8.5 represents a scenario in which global greenhouse gas emissions continue to rise uncontrolled with temperature increases exceeding 4°C by the end of the century.

15.4.16 As recommended by the NPS for Water Resources Infrastructure (Defra, 2023) and the Institute of Environmental Management and Assessment (IEMA) (2020), projections for the RCP8.5 "high emissions" scenario have been used to understand potential future changes in key climate variables at the location of the Project. Projected changes in climate for the 25km grid-square within which the Project is located (centred on 512500,162500), under the UKCP18 high emissions scenario and for a 50% probability of occurrence, are presented in Table 15.2 for the periods 2020 – 2049, 2050 – 2079 and 2079 – 2099.

15.4.17 The projections shown in Table 15.2 indicate that while annual mean precipitation is projected to decrease slightly by the 2080s, winter precipitation is projected to increase by 20.2% and summer mean precipitation decrease by 36.9%. By the 2080s, annual mean, winter mean and summer mean temperatures are projected to increase by 3.9ºC, 3.3ºC and 5.9ºC, respectively.

15.4.18 The projected change in temperatures and precipitation for the 2030s (short-term changes coinciding with expected construction of the Project) show smaller changes, with a 1.1ºC increase in annual mean temperature, a 6.8% increase in winter mean precipitation and a 7.5% decrease in summer mean precipitation.

Table 15.2 Projected changes in climate at the location of the Project

Climate metric	Observed baseline 1981-2020	Projected change (UKCP18 RCP8.5 (50% probability))		
		2030s (2020–2049)	2060s (2050–2079)	2080s (2070–2099)
Annual mean accumulated precipitation	676.5mm	+0.3%	-2.3%	-2.3%
Winter mean accumulated precipitation	177.3mm	+6.8%	+13.1%	+20.2%
Summer mean accumulated precipitation	148.2mm	-7.5%	-22.2%	-36.9%

Climate metric	Observed baseline 1981-2020	Projected change (UKCP18 RCP8.5 (50% probability))		
		2030s (2020–2049)	2060s (2050–2079)	2080s (2070–2099)
Annual mean temperature	10.7ºC	+1.1ºC	+2.6ºC	+3.9ºC
Mean winter minimum temperature	5.0ºC	+0.9ºC	+2.3ºC	+3.3ºC
Mean summer maximum temperature	16.9ºC	+1.6ºC	+3.9ºC	+5.9ºC

15.4.19 Flooding can occur in the Thames Estuary when high tides coincide with low-pressure weather systems. This results in storm tides. Storm tides lead to additional water entering the estuary from the North Sea. Areas of low-lying land (floodplains) in the estuary would be at significant risk of flooding if flood defences did not protect them. Sea level in the Thames Estuary is now expected to rise by around 1.15 metres by the end of this century[373] increasing the risk of flooding.

15.4.20 Based on the GeoClimate UKCP18 dataset[374], it is considered 'probable' under 'average' soil humidity conditions that foundations will be affected by increased clay shrink-swell due to climate change in the region of the Project by the 2080s (which is the same for much of the London area due to the underlying geology e.g. London Clay). This suggests that the Project will potentially be vulnerable to subsidence in the future.

15.4.21 The UK Government is required to conduct a UK Climate Change Risk Assessment (CCRA) every five years as set out in the UK Climate Change Act 2008. The latest version[375], which was published in 2022, is based on an independent assessment undertaken by the Climate Change Committee, which sets out the risks and opportunities to the UK from climate change up to 2100, including the Committee's advice on priorities for adaptation for the coming five-year period.

15.4.22 The Independent Assessment of UK Climate Risk[376] provides the Committee's statutory advice to Government on priorities for the forthcoming national adaptation plans and wider action. It is informed by new evidence gathered for the accompanying Climate Change Risk Assessment (CCRA3) Technical Report[377].

15.4.23 The CCRA3 Technical Report highlights that the gap between the level of risk faced and the level of adaptation underway has widened, where adaptation action has failed to keep pace with the worsening reality of climate risk.

15.4.24 In relation to the water sector specifically, the CCRA3 Water Sector Briefing[378] identifies the following key risk areas of relevance to the Project:

- '*Water infrastructure, such as reservoirs, dams, pipelines, water treatment plants and sewage treatment plants, are all at risk from the impacts of climate change, especially increases in the frequency and intensity of surface water and coastal flooding*
- *Water infrastructure assets represent a key element of the UK infrastructure system and could affect, or be affected by, failures of other assets due to extreme weather, such as energy systems, transport and information and communications technology (ICT)*
- *There are also risks to buried infrastructure, such as water pipelines, with damage potentially becoming more frequent in future due to flooding and subsidence*
- *More frequent flooding could also impact on water treatment facilities leading to potential reductions in water quality, in turn impacting upon health*
- *Future projections of more frequent and intense dry periods lead to concerns around the availability of public water supplies in future, especially in England and parts of Wales. Private water supplies are also at risk*'

15.5 Sensitive Receptors and Potential Environmental Effects

Assessment scope

Greenhouse gases

15.5.1 The IEMA Guide for Assessing Greenhouse Gas Emissions and Evaluating their Significance sets out the principle that all greenhouse gas emissions from projects contribute to climate change and therefore might be considered significant. It also advises that changes in greenhouse gas emissions should be contextualised in terms of the percentage contribution to UK carbon budgets as well as any sector specific analyses, strategies and net zero compatible reduction trajectories (in alignment with the NPS for Water Resources Infrastructure[379]). As such the carbon dioxide equivalent emissions of greenhouse gasses arising over the lifecycle of the development will be assessed with regards to impacts on UK carbon budgets (as a proxy for the global climate receptor) and with regard to Thames Water's pledge to achieve net zero operational carbon emissions by 2030.

15.5.2 The greenhouse gas assessment, and approach to mitigation, will follow the whole-life carbon principles of PAS 2080:2023, a globally applicable standard for managing carbon in buildings and infrastructure. In line with IEMA guidance, calculations of GHG emissions will use data consistent with

the whole-life carbon modular approach and lifecycle stages and modules defined in BS EN 15978. The assessment will include construction (including any demolition) and operation.

15.5.3 For the purposes of this assessment, the Project's infrastructure is assumed to have an operational lifetime of 60 years, although it is likely to extend beyond this. Therefore, operational greenhouse gas emissions will be estimated over a period of 60 years after opening. Greenhouse gas emissions associated with replacement and/or refurbishment of the Project after this point will, however, be excluded from the assessment. The decommissioning (BS EN 15978 end of life stage, lifecycle module C) of the Project is scoped out (as confirmed in paragraph 5.6.21 of Chapter 5 EIA Methodology).

15.5.4 The IEMA (2022) guidance states that activities that do not significantly change the result of the assessment can be excluded where expected emissions are less than 1% of total emissions, and where all such exclusions total a maximum of 5% of total emissions. On this basis, the following emission sources have been scoped out of the assessment:

- Emissions associated with changes in land use – the Project is considered unlikely to result in substantial changes in areas of different land uses, therefore potential emissions associated with changes in land use are scoped out of the assessment
- Emissions associated with the disturbance of carbon stores (e.g. soils and vegetation) – Given the primarily urban nature of the study area, the Project is considered unlikely to result in the disturbance of substantial carbon stores (e.g. vegetated soils and/or vegetation), therefore potential emissions associated with the disturbance of carbon stores are scoped out of the assessment

15.5.5 The anticipated emission sources of the development with respect to the life cycle stages and modules defined in BS EN 15978, which will be assessed in the EIA are set out in Table 15.3.

Table 15.3 Anticipated greenhouse gas emission sources scoped in or out of the EIA

Lifecycle stage	Lifecycle module	Activity	Emissions sources	Scoped In/Out
Construction (Before use stage)	A0	Nonphysical process before construction, preliminary studies, tests and design	Transportation of survey staff to and from site.	OUT (Assumed to be negligible)
	A1-A3	Raw material supply, transportation and	Embodied carbon in building materials	IN

Lifecycle stage	Lifecycle module	Activity	Emissions sources	Scoped In/Out
		manufacturing of building materials		
	A4	Transportation of building materials	Transportation of building materials to the site	IN
	A5	Staff commuting	Transportation of construction staff to and from the site	IN
	A5	On-site construction activity	Fuel use in mobile plant and equipment	IN
		Waste disposal and transportation	Transportation and disposal of waste	IN
Operation (Use stage)	B1	Use	Chemical purchase and use Process emissions	IN
	B2-B3	Facility maintenance and repair	Standard maintenance and repair work	IN
	B2-B3	Raw material supply, transportation and manufacturing of building materials	Embodied carbon in building materials for ongoing maintenance and repair works	IN
	B4	Replacement	Embodied carbon in building materials	IN
	B5	Refurbishment	Embodied carbon in building materials	OUT (Beyond Project lifetime)
	B6	Operational energy use	Operational energy consumption	IN
	B7	Operational water use	Potable water consumption	OUT (Assumed to be negligible)

Vulnerability

15.5.6 Table 15.2 indicates that projected changes in key climate parameters in the short-term are relatively minor. The potential impacts listed in Table 15.4 would be unlikely to be of sufficient magnitude to lead to a significant effect and will be managed through the adoption of good practice construction management techniques and design of working areas, compounds and related infrastructure. Consequently, potential impacts related to the Project's vulnerability to climate change during the construction phase are proposed to be scoped out from further assessment.

15.5.7 The assessment of the Project's vulnerability to climate change will consider climate change up to the end of the century. Climate projections for the 2080s (2070-2099, the latest data for which projections are currently available), for the high emissions (i.e. RCP8.5) scenario at the 50% probability level, will therefore be used to represent changes in climate over the long term.

15.5.8 Should elements of the Project be identified which are critical to operational safety, lower likelihood, worst case climate projection data and relevant climate extremes projection data will be considered for assessment.

15.5.9 As identified in Table 15.2, projected changes in climate over the longer term suggest that there could be substantial increases in both summer temperatures and winter precipitation in the area of the Project. The assessment of the vulnerability of the Project to climate change would therefore focus on potential impacts associated with changes in temperature and precipitation only.

Potential effects

Greenhouse gases

15.5.10 Increases in greenhouse gas emissions as a result of a Project, should they be sufficiently large, could impact the global climate by contributing to the cumulative impact such emissions have on climate change. It is not possible, however, to attribute the resulting impact of a certain quantity of greenhouse gas emissions to effects on a specific receptor. The most appropriate geographic level for an assessment of the impact of a certain quantity of greenhouse gas emissions is at a national level (i.e. by comparison to UK carbon budgets), as that is the level at which Parliament has jurisdiction and has specified in the NPS for Water Resources Infrastructure (paragraphs 4.4.12 and 4.4.15) the assessment shall be undertaken.

15.5.11 The NPS for Water Resources Infrastructure (paragraph 4.4.11) also recognises that 'while it is unlikely that any emissions increase from an individual development of water resources infrastructure will materially affect the government's ability to meet its emissions targets', evidence should be

provided of 'the climate impact of the development and an assessment of emissions associated with construction and operation against the water company's ability to deliver its contribution to the government's targets and commitments'.

Construction

15.5.12 The greenhouse gas emissions during the construction phase of the Project would be associated with:

- Embodied carbon (i.e. greenhouse gases generated during the manufacture of the raw materials required to build the Project)
- Energy consumption (e.g. through petrol or diesel combustion and use of electricity) and water consumption as a result of:
  - the transportation of raw materials to the construction site
  - the transportation and treatment of waste
  - the transportation of construction workers, onsite staff, and visitors to, from and within the construction site, and
  - construction activities and the operation of onsite construction plant, machinery and equipment, site offices and welfare facilities

Operation

15.5.13 The greenhouse gas emissions during the operational phase of the Project would be associated with:

- The use of electricity to operate plant and equipment which forms part of the Project
- The manufacture of materials required to support activities such as the planned maintenance, repair and replacement of assets
- Consumption of energy (e.g. through fuel combustion and use of electricity) by plant and equipment during maintenance, repair and replacement activities, and as a result of the transportation of any associated materials and/or employees
- Emissions associated with the consumption of chemicals
- Process emissions

Vulnerability

15.5.14 The projected changes in climate variables over the relatively short term (2020 – 2049) shown in Table 15.2, suggest increases in temperatures (especially during summer, +1.6°C) and precipitation during winter (+6.8%) have the potential to occur. Table 15.4 identifies climate related impacts on receptors during construction, including temporary works, which could potentially occur as a result of these changes.

15.5.15 As identified in Table 15.2, projected changes in climate variables over the longer term suggest that substantial increases in temperature, especially during summer (+5.9°C), and precipitation during winter (+20.2%) have the potential to occur in the study area. Table 15.4 sets out how changes in

temperature and precipitation could potentially impact receptors during the construction and operation of the Project.

Table 15.4 Potential impacts resulting from changes in climate during construction and operation phases

Change in climate	Receptor(s)	Potential impact
Construction		
Increased temperatures, including prolonged periods of hot weather and drought.	Construction workforce Construction plant and machinery	Increased risk of health and safety impacts for construction workforce and/or overheating and failure of construction plant and machinery.
Increased precipitation, including periods of intense rainfall, increased frequency and intensity of flooding	Construction site access routes	Extreme weather events or climate variations result in flooding limiting access to construction sites.
	Construction areas Construction workforce Construction plant and machinery	Increased risk of flooding of construction works areas, plant and machinery including construction compounds and associated increased risk of health and safety impacts to construction workforce.
	Excavations and earthworks	Risks to slope stability associated with changes in pore water pressure. Risk of scour and erosion of earthworks.
Operation		
Increased temperatures, including prolonged periods of hot weather.	Project infrastructure Equipment and machinery	Extreme weather events (e.g. heatwaves) and average temperatures impacting on the integrity of Project infrastructure and/or performance of equipment and machinery.
	Project infrastructure Equipment and machinery	Future climate scenarios could lead to increased drought conditions which could require the Project to be utilised more than expected, putting increased pressure on the Project during operation.

Change in climate	Receptor(s)	Potential impact
Increased precipitation, including intense periods of rainfall, increased frequency and intensity of flooding.	Project infrastructure Site access	Increased risk of flooding of Project infrastructure and site access affecting operation.
Increased temperatures, including prolonged periods of hot weather/increased precipitation, including intense periods of rainfall.	Project infrastructure	Climate change affects clay shrink-swell susceptibility and increases the likelihood of ground movement, which causes subsidence.

15.5.16 Table 15.4 indicates potential impacts for both construction and operational phases for completeness. However, as stated earlier due to the projected changes in key climate parameters in the short-term being relatively minor the potential impacts will be managed through the adoption of good practice construction management techniques and design and would be unlikely to be of sufficient magnitude to lead to significant effects. Consequently, potential impacts related to the Project's vulnerability to climate change during the construction phase are proposed to be scoped out from further assessment.

15.6 Assessment Methodology

Greenhouse gases

15.6.1 Appropriate carbon calculation methods, models and techniques would be used to quantify the greenhouse gas emissions for the sources listed in Table 15.3. These would generally rely on quantifying the activity and multiplying this by the relevant carbon emissions factor. The latest available information on the detailed design and construction methodologies at the time would be used as the basis of the calculations. Appropriate and widely accepted industry standard emission factors for construction materials, activities and energy use/consumption would be used. Supplier specific emissions data could be utilised for certain materials or activities in place of generic industry emissions factors where available, and suitably robust. Details on the methodology, activity data and carbon factors used for each source will be provided in the ES.

15.6.2 There is no set significance threshold for changes in emissions of greenhouse gasses. IEMA (2022) guidance indicates that the crux of significance is not whether a development emits greenhouse gasses, nor even the magnitude of greenhouse gas emissions, but whether the development contributes to reducing greenhouse gas emissions relative to a

comparable baseline consistent with a trajectory towards net zero by 2050 (see section 6.2 of the IEMA (2022) guidance).

15.6.3 The adoption of a net zero target does not mean that consent cannot be granted for a development that will increase greenhouse gas emissions, for as stated in paragraph 4.4.15 of the NPS for Water Resources Infrastructure '*any increase in greenhouse gas emissions from the project alone is not a reason to refuse development consent for infrastructure to secure water supplies*'. Instead, and again as stated in paragraph 4.4.15 of the NPS for Water Resources Infrastructure, it is necessary to evaluate whether '*the increase in greenhouse gas emissions resulting from the project is so significant that it would have a material impact on the ability of the government to meet its greenhouse gas reduction obligations and commitments including but not limited to, net zero, the Nationally Determined Contribution and carbon budgets*'.

15.6.4 The Government has adopted the carbon budgets in order to meet the goals of the Paris Agreement and the target of net zero by 2050. Thus, a proposed development which is compatible with the 2050 target and interim carbon budgets is consistent with the approach to addressing the adverse effects of climate change. This aligns with the approach to significance set out in the IEMA (2022) guidance.

15.6.5 In the light of the above, an assessment would be made, based on professional judgement, as to whether increases in greenhouse gas emissions as a result of the Project could have a material impact on the ability of the UK Government to meet its carbon reduction targets (and would therefore potentially be significant). This would consider whether the project is in line with existing and emerging policy requirements for carbon emissions reduction, Thames Water's own climate change policy and Water Resources Management Plan[380], and the extent to which the Project has reduced carbon as far as reasonably practicable.

15.6.6 Table 15.5 provides significance of effect descriptions from the IEMA (2022) guidance which will be used to assist the judgement of significance. In line with section 5.7 in Chapter 5 EIA Methodology effects that are deemed to be 'significant' are those where the magnitude is moderate or major adverse. Magnitudes of minor adverse or negligible are generally considered to represent an effect which is "not significant". The determination of magnitude is proposed to include contextualising the predicted greenhouse gas emissions against the carbon budgets and, where relevant, against more localised emissions or sector based carbon reduction targets.

*Table 15.5 Proposed significance criteria**

Magnitude	Assessment criteria
Major Adverse	A project's greenhouse gas impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for such types of projects. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.
Moderate Adverse	A project's greenhouse gas impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for such types of projects. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.
Minor Adverse	A project's greenhouse gas impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for such types of projects. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.
Negligible	A project's greenhouse gas impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for such types of projects, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.
Beneficial	A project's net greenhouse gas impacts are below zero, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

**Source: IEMA 2022*

Vulnerability

15.6.7 For operational phase impacts, the IEMA (2020) Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation sets out a risk assessment methodology whereby vulnerability is assessed based on the potential for climate impacts to occur (likelihood) and their impact magnitude (severity). The vulnerability assessment methodology can be summarised into the following steps:

- identifying potential climate change risks to the Project receptors
- assessing these risks (taking account of embedded mitigation), and
- (if required) developing further mitigation measures to reduce impacts

15.6.8 Table 15.6 below provides the criteria which will be used to assess the likelihood of each climate change related risk to the Project during the operational phase.

*Table 15.6 Likelihood categories for the identification of climate change related risk**

Likelihood category	Description (probability and frequency of occurrence)
Very high	The event occurs multiple times during the lifetime of the Project (60 years), e.g. approximately annually, typically 60 events
High	The event occurs several times during the lifetime of the Project (60 years), e.g. approximately once every five years, typically 12 events.
Medium	The event occurs limited times during the lifetime of the Project (60 years), e.g. approximately once every 15 years, typically 4 events.
Low	The event is only likely to occur once during the lifetime of the Project (60 years), e.g. once in 60 years.
Very Low	The event is unlikely to occur during the lifetime of the Project (60 years).

**Adapted from source: IEMA, 2020*

15.6.9 Table 15.7 below provides the impact magnitude criteria which will be used to assess each climate related risk to the development.

*Table 15.7 Impact magnitude criteria for risks as a result of climate change**

Impact magnitude	Description
Very large adverse	Site-wide disruption/loss of function and usability that is permanent or irreversible and disruption to regional water supplies.
Large adverse	Site-wide disruption/loss of function and usability lasting more than 1 week and potential disruption to regional water supplies.
Moderate adverse	Partial site-wide disruption/loss of function and usability lasting more than 1 day and less than 1 week, with limited disruption to regional water supplies.
Minor adverse	Partial site-wide disruption/loss of function and usability lasting less than 1 day.
Negligible	Disruption to site negligible causing no disruption in function and usability.

**Adapted from source: IEMA 2020*

15.6.10 The significance of each climate change risk will then be assessed by combining the likelihood and magnitude scores using the matrix provided in Table 15.8 below.

*Table 15.8 Effect significance scoring matrix**

		Measure of likelihood				
		Very low	Low	Medium	High	Very high
Measure of Impact	Negligible	NS	NS	NS	NS	S
	Minor	NS	NS	NS	S	S
	Moderate	NS	NS	S	S	S
	Large	NS	S	S	S	S
	Very large	NS	S	S	S	S

NS= Not significant S= Significant

**Source: IEMA 2020*

In Combination Climate Impacts

15.6.11 In combination climate impacts (ICCIs) refer to the combined impacts of climate change on environmental receptors assessed for other environmental aspects. An ICCI assessment will be undertaken to consider the extent to which climate change could worsen a potential effect on receptors associated with other aspects (i.e. whether the receptor's susceptibility and vulnerability and/or their value/importance changes based on future climate projections). It will also consider if the effectiveness of proposed mitigation (and resulting residual effects) would be altered due to the combined impact with climate change, where these are not already considered as part of the assessment of climate vulnerability described above.

15.6.12 The assessment of ICCIs will adopt a similar approach to that specified for assessing climate vulnerability of the Project. However, the study area will be the study area defined for each environmental aspect.

15.6.13 The first stage will be to determine the likelihood of potential ICCIs occurring for each environmental aspect and screen out environmental aspects where ICCIs are unlikely. The second stage will determine the consequences of the likely ICCIs and determine the significance of effect based on each aspect's assessment criteria.

15.6.14 The ICCI assessment will be undertaken in coordination with the relevant environmental aspect leads to understand the likelihood, consequence and significance of ICCIs, and would predominantly be based on professional judgement.

15.6.15 The receptors to be considered for the ICCI assessment will be determined as part of the EIA, once likely effects have been identified for each environmental aspect as part of the EIA process.

15.7 Mitigation

Greenhouse gases

15.7.1 The NPS for Water Resources Infrastructure (paragraph 4.4.16) indicates that all projects should '*ensure that the greenhouse gas emissions are as low as reasonably practicable'* and '*the adequacy of the mitigation measures will be a material factor in the decision-making process*".

Primary

15.7.2 Indicative opportunities to reduce the magnitude of greenhouse emissions associated with construction activities include:

- Maximising the use of on-site materials, which could reduce HGV movements
- Reducing the use of resources, and maximising the use of renewables or materials with recycled or secondary content to reduce the amount of carbon embodied in the construction materials
- Reduction of import and export of fill and materials, and
- Using lower carbon and more energy efficient construction plant and machinery such as hybrid electric, hydrogen or alternative lower carbon fuels

15.7.3 Indicative opportunities to reduce the magnitude of greenhouse gas emissions associated with the operation and maintenance of the Project include:

- Engaging with the supply chain to try and reduce the carbon intensity of the chemicals used during the operation of the Project
- Resource efficiency to reduce the quantities of chemicals used during operation
- Procurement of low carbon and renewable energy generated electricity
- Designing, specifying and constructing the Project with a view to increasing the operational lifespan of assets, thereby reducing the need for maintenance
- Employing modular construction techniques to reduce on-site maintenance requirements and/or allow the use of lower carbon replacements in the future
- Making adequate provision to support the use of low emission vehicles where appropriate
- Incorporating the use of energy efficient pumping and water treatment equipment
- Gravity fed transfers could require less energy requirements for pumping

Secondary

15.7.4 Additional mitigation measures may be identified during the assessment process.

Tertiary

15.7.5 At this stage, no tertiary mitigation measures have been identified. However, such measures would be presented, if necessary, during the preparation of the ES.

Vulnerability

Primary

15.7.6 Up-to-date design and construction standards, along with good engineering practice, will be applied to the design and construction of the Project. The use of such adaption measures, which will be embedded in the design of the Project, is expected to improve the resilience of the Project to changes in climate.

15.7.7 Indicative opportunities that may potentially help reduce the vulnerability of the Project to climate effects during operation include:

- Developing the Project design (in particular the drainage system) with reference to Environment Agency and Local Lead Flood Authority guidance regarding peak rainfall (including appropriate climate change allowances)
- Designing and specifying assets and mechanical equipment which are resilient to projected increases in peak summer temperatures
- Designing and specifying assets, drainage systems and other elements with a view to projected changes in precipitation characteristics as well as increased variability of ground conditions (wetting and drying)
- Specifying regular inspection of drainage infrastructure, materials and assets to identify any deterioration along with additional inspections after extreme weather events

Secondary

15.7.8 Additional mitigation measures may be identified during the assessment process.

Tertiary

15.7.9 At this stage, no tertiary mitigation measures have been identified. However, such measures would be presented, if necessary, during the preparation of the ES.

15.8 Summary of Scope for the EIA

15.8.1 A summary of those factors to be scoped in or out of the ES is provided in Table 15.9.

Table 15.9 Summary of the scope for Carbon and Climate Change

Aspects	Potential effect		Comments
	Construction	Operation	
Greenhouse gases	IN	IN	An assessment would be undertaken of potential changes in greenhouse gas emissions during the construction of the Project. Further details of the specific emission sources 'scoped in' to the assessment are provided in Table 15.3.
Vulnerability	OUT	IN	An assessment of the potential vulnerability of the Project to climate change related impacts during construction has been 'scoped out' as projected changes in climate over the short term are minimal and potential impacts would be controlled by good practice mitigation measures.
In combination climate assessment	OUT	IN	An assessment of in combination climate impacts during construction has been 'scoped out' as projected changes in climate over the short term are minimal.

16 Socioeconomics, Community, Access and Recreation

16.1 Introduction

16.1.1 This chapter of the Environmental Impact Assessment (EIA) Scoping Report sets out the proposed scope of the EIA in relation to socioeconomics, community, access and recreation. Regulation 5(2) of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations') states that *'the EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on…population.'*[381]

16.1.2 The aim of this chapter is to:

- Identify the relevant receptors which could be potentially impacted by the Project
- Evaluate potential construction and operation impacts and identify those impacts which may lead to likely significant effects
- Outline the proposed scope of work and assessment methodology for assessing within the Environmental Statement (ES) the socioeconomic, community, access and recreation effects associated with the Project

16.1.3 The construction and operation of the Project may have short or longer term economic and/or social impacts on local communities, businesses, and services. Socioeconomic effects could include effects such as direct employment, education and skills attainment and change in economic activity associated with project expenditure. Community effects include effects on amenity for residential, community and commercial receptors due to a combination of impacts from various sources including noise, traffic, visual and air quality. Access and recreational effects could occur due to land-take which may affect the quantity and/or quality of community and recreational space available, or disruption to recreational assets. In each case, these areas are assessed due to their potential to result in significant effects for the population.

16.1.4 The issues that will be considered as part of the assessment include:

- Employment: Impacts on local and regional employment
- Economy: Impacts on local businesses and impacts on local and regional spend
- Skills and education: The impact on educational and skills attainment within the community
- Community amenity: Impacts on residential, commercial and community properties/facilities
- Community accessibility and severance: Impacts on access to residential, commercial and community properties/facilities
- Recreation: Impacts on recreational areas/facilities and their usage

16.1.5 The content of this chapter should be read in conjunction with the following chapters:

- Chapter 2 The Project
- Chapter 6 Air Quality
- Chapter 7 Noise and Vibration
- Chapter 12 Townscape and Visual Amenity
- Chapter 13 Water Resources and Flood Risk
- Chapter 14 Human Health
- Chapter 17 Waste and Materials
- Chapter 18 Traffic and Transport

16.2 Consultation and Engagement

16.2.1 Non-Statutory Public Consultation was undertaken from October 2023 to December 2023 to seek feedback about the site options for the Project from variety of people such as landowners, residents, businesses, local authorities, and other statutory bodies who might be affected by or interested in the Project. In relation to socioeconomic, community access and recreation, concerns were raised regarding potential adverse impacts to local communities, open and green spaces including the Thames Path and disruption to recreational and leisure activities.

16.2.2 Further engagement has taken place with representatives from London Borough of Hounslow (LBH), London Borough of Richmond upon Thames (LBR), and Royal Borough of Kingston upon Thames (RBK) councils. A meeting was arranged with the three councils on 29 July 2024 to outline the approach to the socioeconomic, community, access, and recreation assessment. Only representatives from LBR were ultimately able to attend the meeting. The Project team provided an outline of which matters were proposed to be scoped in and which were proposed to be scoped out. During the meeting questions were posed to LBR regarding if there were any gaps in the information presented, any social, economic, community, access or recreational developments, priorities, or initiatives the Project team should be aware of. Attendees agreed with the information presented.

16.2.3 More generally, Thames Water has established the River Stakeholder Forum and the Project is now a standing item on the existing agenda for Mogden Residents Stakeholder Forum. Participants for the River Forum were suggested to the project team by Munira Wilson MP. The group comprised of local businesses and groups with a specific interest in the projects interaction with the river. The Mogden Residents group is an established group that has a close relationship with Mogden Sewage Treatment Works (STW). As well as comprising of representatives from the local resident community, the groups also comprises of local council officers, councillors and local MPs. Engagement with these groups will continue and be used to

help inform the assessment. It is also proposed that the boroughs' Economic Development Officers are engaged during the EIA process to inform the assessment.

16.3 Legislation and Policy Review

16.3.1 Relevant legislation and planning policies will be used to inform the assessment of potential environmental effects. This includes planning policy and strategy documents produced by the host local boroughs, these being LBH, LBR, and RBK.

16.3.2 The following elements from the Department for Energy, Food and Rural Affairs' (Defra) National Policy Statement (NPS) for Water Resources Infrastructure[382] are considered relevant to the assessment:

- Paragraph 4.13.3 the applicant should consider how the impacts of the infrastructure during construction and operational phases, such as job creation and increased spending in local economies, visual impacts, and traffic and transport may affect local communities and amenities
- Paragraph 4.13.4 applicants should describe the existing socioeconomic conditions in the areas surrounding the proposed development, following appropriate consultation with those most affected, and should refer to how the development's socioeconomic impacts correlate with local planning policies. The applicant should also describe the existing demographics within the area and assess how the development could affect any equalities groups. Applicants should assess any likely significant positive and negative socioeconomic or equalities impacts as part of an ES
- Paragraph 4.13.5 the assessment should cover any socioeconomic impacts appropriate to the proposed development. Examples include:
  - the creation of jobs and training opportunities
  - the provision of educational and visitor facilities
  - the impact of the proposed new facility on tourism, local businesses or local services; and,
  - opportunities to provide a direct water supply to local business water users
- Paragraph 4.13.6 socioeconomic impacts may be linked to other impacts, for example the visual impact or an individual's perception of a development. It may also have an impact on the local economy and local businesses. Where such impacts are relevant to the development, an applicant should include them in their assessments
- Paragraph 4.13.7 Any cumulative effects on communities should be assessed. For instance, a potential shortage of construction workers to meet the needs of other industries and major projects within the region

- Paragraph 4.13.9 the Secretary of State (SoS) should consider whether the mitigation measures put forward by the applicant are acceptable to mitigate any adverse socioeconomic impacts of the development. For example, high quality design and/or screening (such as by natural features) can improve the visual and environmental experience for visitors and the local community alike

16.3.3 The Project would have regard to relevant legislation, policy and guidance framework for this aspect as listed in Table 16.1.

16.3.4 A detailed summary of the legislative, policy and guidance framework for this aspect, and how it accords with the Project would be provided in the Preliminary Environmental Information (PEI) Report and ES.

Table 16.1 Relevant legislation and policy

Relevant legislation, policy and guidance
Legislation
The Countryside and Rights of Way Act 2000[383]
Environmental Protection Act 1990[384]
Sections 2 to 5 of the Water Industry Act 1991[385]
National policy
NPS for Water Resources Infrastructure 2023[386]
The National Planning Policy Framework (NPPF) (2023)[387]. It is noted that the NPPF (2024) was under consultation until September 2024
Regional policy
The London Plan 2021[388]
Local policies, strategies and frameworks
The LBH Local Plan 2015 - 2030[389] and the LBH Local Plan 2020 - 2041 (emerging policy)
Hounslow: Prosperity and Place: Framework for the Regeneration and Growth of the Borough[390]
Hounslow Green and Blue Infrastructure Strategy (2021)[391]
The LBR Local Plan 2015 - 2018[392] and the LBR 'Pre-Publication' Draft Local Plan (2024)[393]
Richmond Upon Thames Parks and Open Spaces Strategic Principles 2024
The RBK Core Strategy 2012[394] and Kingston's Local Plan 2019 - 2041 (emerging policy)[395]
Kingston Economic Growth and Development Strategy 2018-2025[396]
Kingston Greenspace Strategy (2024-2034)[397]

16.4 Existing Environment and Baseline Conditions

Study area

16.4.1 Effects on socioeconomics, community, access and recreation will occur at different spatial scales. Effects relating to accessibility and land take are likely to occur within the EIA Scoping Boundary whilst other effects, such as effects on employment and the economy may occur further away. The methodology and study area for assessing each of these effects therefore differs and is outlined in more detail in section 16.6 of this chapter.

16.4.2 The study area varies for each matter being assessed, as outlined in Table 16.2 and Plan 16.1 in Appendix A Plans.

Table 16.2 Study areas for each assessment matter

Assessment matter	Study area	Phase of Project under consideration
Employment	Employment effects are considered within the administrative area of the Greater London Authority as this has been identified as the geography within which 'local' labour may be sourced.	Construction phase
Economy	Economic effects are considered within the administrative area of the Greater London Authority as this has been identified as the geography most likely to experience adverse or beneficial effects.	Construction phase
Skills and education	The study area for the assessment of effects on skills and education will be the boroughs of LBH, LBR and RBK. These boroughs are expected to be the focus for any local workforce development initiatives due to their proximity to the Project.	Construction phase
Community amenity	The study area will align with other disciplines that feed into the amenity assessment: Traffic and Transport (Chapter 18), Air Quality (Chapter 6), Noise and Vibration (Chapter 7), and Townscape and Visual Amenity (Chapter 12) and will be defined by the maximum extent at which two aspects intersect. Refer to the relevant chapters for individual study area figures.	Construction and operational phases

Assessment matter	Study area	Phase of Project under consideration
Community accessibility and severance	As defined by the Design Manual for Roads and Bridges (DMRB)[398] the core study area will be 500m from the EIA Scoping Boundary. This will be extended where necessary to capture effects associated with traffic movements outside of this 500m buffer, such as those arising from displaced traffic in line with the study area for the assessment of traffic and transport effects in Chapter 18.	Construction and operational phases
Recreation	The core study area for the assessment of recreation effects will be 500m from the EIA Scoping Boundary. Where necessary, this will be extended to capture effects relating to the use and influence of the River Thames for recreation.	Construction and operational phases

Baseline conditions

Desk based assessment

16.4.3 Desk based research to inform this baseline has been undertaken using the following sources:

- ONS 2021 Census data and annual population, business, and employment surveys
- Borough local plans
- Borough business and recreation plans
- Online mapping applications including Google Maps, Google Earth, AddressBase Plus mapping (various, 2024)
- Recreational stakeholder groups engaged as part of the ongoing River Stakeholder Forum consultation
- Port of London Authority – for details of business and organisations holding permits for use of the River Thames
- Environment Agency lock keeper and Port of London Authority sluice operator

16.4.4 Recreational stakeholder groups have also been engaged with as part of the ongoing River Stakeholder Forum consultation as described in section 16.2.

Settlement overview

16.4.5 The Project is located in west London, within three boroughs: LBH, LBR and RBK. The geography of these boroughs varies significantly. The LBH is the most densely populated, with the area of Twickenham surrounding the northern part of the Project. Land use surrounding the Mogden STW site is predominantly residential with some commercial areas and the Twickenham rugby stadium (Allianz Stadium).

16.4.6 South of Twickenham, the Project passes through the community of Ham in LBR, which is predominantly residential but with areas of green space (Ham River Lands) close to the banks of the River Thames. The community of Teddington is located to the west of the River Thames. Of the three boroughs within which the Project is located, LBR is least densely populated in part owing to the large areas of green space within its boundary, including Richmond Park, Hampton Court Palace and Bushy Park. Housing in the areas surrounding the Project is mixed, from relatively new estates with a combination of housing types, to streets of low rise apartment blocks and townhouses, to streets with older terraced housing, semi-detached and detached properties. There are also some small residential communities located on islands within the River Thames such as Trowlock Island approximately 470m upstream of Teddington Weir and Eel Pie Island, Twickenham, both within LBR.

16.4.7 The communities of Kingston upon Thames are south of the Project. The RBK has a range of education, retail and entertainment services and a mix of housing from large, detached houses in landscaped settings, to Victorian and Edwardian villas and terraces and post-war suburbs of semi-detached houses.

Population

16.4.8 Between the last two censuses (held in 2011 and 2021), the population in all three boroughs increased. The total population of Hounslow was 288,181 in 2021, which represents a rise of 13.5% since 2011[399]. Hounslow's population increased by a greater percentage than the overall population of London (7.7%), and by a greater percentage than the overall population of England (up 6.6% since the 2011 Census). The population of Kingston has increased by 5% since 2011, in total, 168,063 people lived in the borough in 2021[400]. A similar increase was recorded for Richmond, where the population increased by 4.4% to 195,278 inhabitants between 2011 and 2021. In comparison with the London and England average, the populations in Kingston and Richmond increased by a smaller percentage[401].

Economy

16.4.9 London generates around a quarter of the UK's total Gross Domestic Product (GDP). In 2022, the London GDP stood at £562.2 billion. London's GDP had been rapidly growing since the global economic recession in 2008 until 2020 when the Covid-19 pandemic led to an economic downturn. According to the ONS regional accounts, the 2022 GDP has now exceeded pre-pandemic levels of £511.3 billion[402].

Employment

16.4.10 Based on data from the Annual Population Survey (April 2023 - March 2024) the employment rate for the Greater London area was 74.5%, equating to 4,608,000 aged between 16 and 64 in employment[403]. This compares to 75.7% which is the England average employment rate for the same time period.

16.4.11 In Hounslow, the percentage who were employed in 2024 was 77.2%. Of Richmond residents aged 16 years and over, 73.7% were estimated to be employed in 2024[404]. In Kingston, the employment rate is the highest of all boroughs at 80.6%[405].

16.4.12 According to the Annual Population Survey (2024), in 2023, 5.7% of London's workforce was employed in the construction sector. In Hounslow and Kingston, the percentage of the workforce employed in the construction industry were 4.1% and 3.8% respectively. No estimates were available for Richmond, as the sample size was too small[406].

16.4.13 Gross Value Added (GVA) is the measure of the value of goods and services produced in an area, industry, or sector of an economy. As construction-related employment produces goods and services to the wider economy, it also inherits a GVA value. The most recent GVA data provided by the Office for National Statistics (ONS) is from 2023 and benchmarks the GVA of construction-related jobs in the UK at £69,509 in current prices[407].

Education

16.4.14 The 2021, census shows that 41.6% of Hounslow's 16 years or over population are educated to degree level or equivalent (National Vocational Qualification (NVQ) Level 4 and above). This is below the London rate (46.7%) but above the national rate (33.9%). Similarly, 51.4% percent of Kingston's and 60.4% of Richmond's population over 16 years have attained a level 4 or above qualification[408].

16.4.15 Nationally, 18.1% of the population aged 16 years and over do not hold any formal qualifications. This means they have not completed GCSEs, A-Levels, or any other recognised qualification. In Hounslow, this percentage is higher at 18.6%. In comparison, 11.9% of Kingston's population and 9.1% of Richmond's population have no qualifications[409].

Equality groups

16.4.16 In line with the NPS for Water Resources Infrastructure (2023)[410], this section describes the existing demographics in the area with regard to equality groups. Equality effects will be considered in a separate Equality Impact Assessment (EqIA) which will be submitted as part of the Development Consent Order (DCO) application if significant impacts are identified at the screening stage of the EqIA process. Therefore, whist baseline information is provided, the methodology for the EqIA is not covered within this chapter.

16.4.17 Equality groups refers to those groups with 'protected characteristics' as defined in the Equality Act 2010. This includes age, gender reassignment, being married or in a civil partnership, being pregnant or on maternity leave, disability, race including colour, nationality, ethnic or national origin, religion or belief and sex.

16.4.18 Across the three boroughs, the demographic breakdown of equality groups is largely in line with the national average. Combined, LBH, LBR and RBK have a slightly higher proportion of children aged 5-19 (18.51% vs. 17.41%) and a lower proportion of adults aged 75 and over (6.26% vs. 8.80%) compared to the national average[411]. These boroughs also exhibit a significantly lower percentage of households with long-term disabilities (25.63% vs. 32.10%)[412].

16.4.19 The religious composition across the three boroughs differs from the national average. While fewer residents identify as having no religion or Christian affiliation compared to the national figure, there is a notably higher proportion of Hindus, Muslims, and Sikhs in this area. Specifically, the percentage of Hindus is over three times the national average (5.82% vs. 1.7%), and the Muslim and Sikh populations are substantially larger as well (10.27% vs. 6.18% and 3.95% vs. 0.87%, respectively)[413].

16.4.20 In terms of ethnicity, combined, LBH, LBR and RBK has a considerably larger Asian, Asian British, or Asian Welsh population (22.30% vs. 8.95%), particularly within the Indian and Other Asian subgroups. Conversely, the White population is lower in this area compared to the national average (62.70% vs. 82.16%)[414].

16.4.21 Regarding gender and sexuality, the population of the three boroughs (LBH, LBR and RBK) combined aligns closely with the England average, with minor variations in categories like gender identity and sexual orientation[415].

16.4.22 The total fertility rate is the average number of live children that a group of women would bear if they experienced the age-specific fertility rates of the calendar year throughout their childbearing lifespan. As of May 2023, the total fertility rate was 1.56 in LBH, 1.40 in LBR and 1.35 in RBK compared to 1.49 children per women across England and Wales[416].

16.4.23 Finally, there are notable differences in marital and civil partnership statuses, with a higher percentage of those married or in a civil partnership in the three boroughs compared to England (48.22% vs. 44.98%) and lower percentages in categories like divorced or civil partnership dissolved and widowed or surviving civil partnership partner[417].

Recreation and social environment

16.4.24 There are several recreational receptors within 500m of the EIA Scoping Boundary including; The Thames River Path, National Cycle Network, various open spaces, amenity land and sports pitches. These sites are well used by the local community, including for local events such as park runs and by local sports clubs.

16.4.25 Furthermore, the River Thames itself provides a recreational and community resource. This includes activities such as angling, boating, rowing, sculling, canoeing, swimming and other water sports. There are several locations for boat moorings, notably at Teddington Locks.

16.4.26 The Thames Young Mariners is an outdoor education centre situated on the right bank of the River Thames in LBR. It has tented overnight accommodation for groups using the outdoor education centre. It is surrounded by the Ham Lands, some 80 hectares of public open space. The Lensbury is located on the left bank of the River Thames at Teddington, which has a hotel and conferencing facilities but also offers membership only leisure facilities.

16.4.27 Recreational surveys to better understand how potential impacts on recreational facilities may affect local communities, recreation, and health have recently commenced and are planned to be undertaken a various points through to June 2025. The methodology for these surveys is outlined in more detail in section 16.6 Assessment Methodology.

Further desk study and survey

16.4.28 It is expected that baseline data gathered regarding socioeconomics, community, access and recreation is liable to change between the time of DCO application submission and the start of construction and operation. This includes data such as: GVA, employment rates, average income, community and recreational assets and population density. Where available, future projections for these parameters will be taken into consideration in the assessment, for example, in determining the potential change in sensitivity of a receptor or magnitude of effect.

16.5 Sensitive Receptors and Potential Environment Effects

16.5.1 The key receptors relevant to the assessment of socioeconomics, community, access and recreation include:

- Residential receptors: private property and housing including gardens, private drives, and land allocated for housing
- Community receptors: community land and assets (e.g. village halls, education facilities, religious facilities, medical facilities)
- Recreational receptors: recreational land and assets (e.g. common land, village greens, open green space, allotments, sports pitches, water sports). This includes national routes, regional routes, local trails and Public Rights of Way (PRoW)
- Commercial receptors: existing businesses, employment sites and land allocated for business and development land
- Economic receptors:
  - Employment: the Greater London Authority labour market
  - Economy: the Greater London Authority economy
  - Skills and education: the skills profile and labour market of the boroughs of LBH, LBR and RBK

16.5.2 The Project has the potential to impact, both positively and negatively, on local communities in a variety of ways, as detailed in Table 16.3.

Table 16.3 Potential socioeconomic, community, access and recreation effects

Matter	Potential beneficial and adverse effects
Employment	Construction: Potential for beneficial effects associated with direct, indirect and induced employment opportunities. These effects would arise during the construction phase and be either temporary or permanent. While the construction phase itself is temporary, this phase of the Project could stimulate long-term economic growth by attracting new businesses and industries to the region leading to permanent job creation. Operation: Permanent employment opportunities during the operation phase are limited to maintenance with the operational workforce expected to be made up of existing Thames Water employees.
Economy	Construction: Potential for beneficial effects on the Greater London economy associated with direct, indirect and induced spend. These effects would arise during the construction phase and be either temporary or permanent. While the construction phase itself is temporary, this phase of the Project could stimulate long-term economic growth by attracting new businesses and industries to the region. Operation: During operation, whilst there will be limited direct spend associated with the operation of the project there could be significant wider economic benefits which derive from improved reliability of water

Matter	Potential beneficial and adverse effects
	supply for example ensuring a reliable water supply during drought periods for residents, businesses, schools, hospitals and other essential services.
Skills and education	Construction: Potential for beneficial effects associated with training and educational opportunities associated with the construction of the Project. These effects would arise during the construction phase and may lead to both temporary and permanent benefits for individuals and the community. For example, where individuals learn skills that enhance their employability in the long term. Operation: Permanent effects on skills and education during operation are expected to be minor with the limited operational workforce expected to be made up of existing Thames Water employees.
Community amenity	Construction: Potential for temporary adverse effects on community amenity due to increased levels of traffic, noise, air pollution and visual impacts during construction. Operation: Potential for permanent adverse effects on community amenity during operation due to noise and townscape and visual amenity impacts. Potential for beneficial effects associated with enhancement of recreation and community receptors such as open space and PRoWs.
Community accessibility/ severance	Construction: Potential adverse effects on community severance and accessibility for local people, communities, businesses and other community activities as a result of construction activities and permanent above ground infrastructure. Whilst many effects would be temporary, occurring only during construction, some effects could be permanent and could include the loss of open space or the need for permanent diversions. These permanent effects would arise during the construction phase. Operation: Permanent impacts on access to community, residential or commercial facilities during operation are expected to be minor. However, there is potential for adverse effects during operation for users of the Tideway, including recreational users, businesses and emergency services due to potential changes in water levels affecting navigation.
Recreation	Construction: Potential for adverse effects on recreational areas and public rights of way, affecting access to land and water-based facilities used for walking, cycling, equestrian activities, fishing, boating, or swimming. Whilst many effects would be temporary, occurring only during construction, some effects could be permanent and could include the loss of open space or the need for permanent diversions. These permanent effects would arise during the construction phase. Operation: Potential adverse effects on recreation associated with operation including potential for permanent diversions to PRoW or a loss of recreational space for users of the Tideway due to changes in water levels.

16.6 Assessment Methodology

Introduction

16.6.1 The assessment examines four different types of potential effects:

- Socioeconomic (considering employment, economic investment and skills and education)
- Community amenity
- Access (considering accessibility, severance and land take)
- Recreation

16.6.2 The methodology for assessing each of these effects differs and is outlined in more detail in the following sections of this chapter.

16.6.3 In general, the methodology outlined in this EIA Scoping Report chapter is informed by a combination of formal guidance and industry good practice. Key resources include:

- Institute of Environmental Management and Assessment (IEMA) Preparing Social-Economic Assessments for EIA[418]
- IEMA Socioeconomic Impact Assessment: Appraisal and Auditing Training[419]
- DMRB: LA 112 Population and Human Health Guidance[420]
- DMRB: LA 104 – Environmental Assessment and monitoring Guidance[421]
- HM Treasury 'The Green Book' [422]

16.6.4 There is limited guidance for the assessment of socioeconomic, community, access and recreation impacts in the UK. Similarly, with the exception of accessibility and land take effects, no formalised sensitivity or magnitude criteria are available to assess effects.

16.6.5 As such, the criteria used to determine the sensitivity and magnitude of impact and the significance of effect will be formulated with professional judgement, industry good practice and experience of similar developments, drawing on the sensitivity and magnitude criteria presented in Chapter 5 EIA Methodology.

16.6.6 The assessment will consider effects associated with both the construction and operation phases of the Project. The assessment of each sub-aspect will also consider the positive and negative impacts on equality groups within the assessment. A separate EqIA is also being carried out and therefore, whist equality impacts will be considered as part of the assessment of community effects, the methodology for the full EqIA is not covered within this chapter. The separate EqIA will be submitted as part of the DCO application if significant impacts are identified at the screening stage of the EqIA process.

Socioeconomic

Employment

16.6.7 Construction of the Project will result in temporary and permanent direct, indirect and induced employment effects. Direct employment relates to the individuals employed as part of the construction of the Project. This direct employment then creates indirect employment in upstream industries that supply and support the core construction activities. Induced employment encompasses jobs beyond the construction and its upstream industries and is created by employees spending their money in the broader economy.

16.6.8 The assessment will consider the impact of the Project on existing levels of employment within the Greater London Authority area. Together with information regarding anticipated required staffing levels during the Project, the number of direct, indirect, and induced jobs will be estimated by applying ONS and Government Blue Book industry employment multipliers.

16.6.9 Sensitivity and magnitude will not be assessed explicitly; rather the number of jobs that would be expected to be filled locally is considered in the context of the total employment baseline within the Greater London Authority to determine whether the effect is significant or not significant.

16.6.10 Employment effects during the operational phase are not considered. General operation activities are expected to be undertaken by existing Thames Water employees and the numbers would be expected to be low. Any employment generation that could be directly attributed to the operation of the project would be minimal and represent a 'no change' or 'no impact' scenario.

Economy

16.6.11 Effects on individual businesses are considered with the assessment of amenity effects. This assessment therefore considers potential wider economic and supply chain effects – both beneficial and adverse during construction and operation.

16.6.12 Supply chain effects will be assessed based on the anticipated non-labour construction expenditure. The labour portion of construction expenditure will be excluded to avoid double-counting with employment effects.

16.6.13 Construction of the Project will result in direct, indirect and induced supply chain effects. Direct effects include direct project expenditure such as the purchase of materials. Indirect effects include business to business spending in the supply chain whilst induced effects include increased expenditure in the local economy resulting from increased income and the presence of construction workers.

16.6.14 Baseline data will be obtained from both the ONS and UK Government Blue Book on industrial multiplier benchmarks. These would be used to estimate the additional economic activity generated by the Project's expenditure.

16.6.15 Sensitivity and magnitude will not be assessed explicitly; rather expenditure effects will be considered against baseline economic performance in the Greater London Authority as measured by GVA to determine whether the effects are significant or not significant.

Skills and education

16.6.16 The construction process will employ a variety of workers in different professions. It is likely that workers will be upskilled through the Project, either through direct initiatives like apprenticeships, or general experience acquired on a large-scale infrastructure project. Training and upskilling provide a benefit to individuals and to the economy.

16.6.17 There is limited guidance on the assessment of effects on skills and education. The assessment will consider the Project's influence on educational and skills attainment within the boroughs of LBH, LBR and RBK. These boroughs are expected to be the focus for any local workforce development initiatives due to their proximity to the Project. Local residents are more likely to be engaged in the Project, which could lead to greater participation in workforce development programs and a stronger sense of ownership in the Project's success.

16.6.18 This includes examining opportunities to enhance education and training provisions, particularly in relation to workforce development, apprenticeships, and career guidance. A focus will be placed on ensuring equitable access to these opportunities for all, including those from particular geographic or protected characteristic groups.

16.6.19 The sensitivity will be determined by considering the baseline skills and qualification levels within the boroughs of LBH, LBR and RBK.
The magnitude of impact will be determined by considering the extent to which the Project provides workforce related skills development, apprenticeships, and career advice which addresses existing skills and education barriers locally. The overall significance of effect will be formulated with professional judgement, drawing on the significance matrix presented in Chapter 5 EIA Methodology.

Community

Community amenity

16.6.20 Community amenity is a term used to describe the pleasantness and 'feel' of a community and the ability for people to enjoy the general character or quality of their surroundings. The community amenity assessment will consider the potential for the construction or operation of the Project to

change how people perceive their communities or how they use commercial facilities, community facilities and recreational resources.

16.6.21 Community receptors such as hospitals and schools may be particularly sensitive to changes in amenity due to the nature of these facilities and the people who use them. Commercial receptors can also be affected by a change in amenity as this could be a feature of a commercial property that makes it more attractive to potential customers, buyers or tenants; for example, a hotel that boasts a particularly good view. Residential receptors can also be affected.

16.6.22 The amenity assessment will draw on the outputs of other relevant assessments – namely Traffic and Transport, Air Quality, Noise and Vibration, and Townscape and Visual Amenity to ascertain if a combination of reported residual impacts from across these aspects could result in an overall amenity effect for residential, community and commercial receptors.

16.6.23 Amenity effects will be assessed for individual receptors by taking the residual effects reported in the relevant aspect sections and determining a 'combined significance' guided by the matrix in Table 16.4.

16.6.24 The matrix can be applied to any combination of four aspects and Table 16.4 shows a simplified significance matrix based on a combination of impacts across four aspects. The assessment will follow a more detailed significance matrix which encompasses a comprehensive set of combinations. Professional judgement will also be applied in determining whether the combination of aspect effects could result in a significant amenity effect overall for that receptor.

*Table 16.4 Significance matrix for the assessment of community amenity effects**

Aspect 1	Aspect 2	Aspect 3	Aspect 4	Combined Significance
Major	Major	Major	Major	Major
Major	Major	Major	Moderate	Major
Major	Major	Major	Minor	Major
Major	Major	Major	Negligible	Major
Major	Major	Moderate	Moderate	Major
Major	Major	Moderate	Minor	Moderate
Major	Major	Moderate	Negligible	Moderate
Major	Major	Minor	Minor	Moderate
Major	Major	Minor	Negligible	Moderate
Major	Major	Negligible	Negligible	Moderate

Aspect 1	Aspect 2	Aspect 3	Aspect 4	Combined Significance
Major	Moderate	Moderate	Moderate	Major
Major	Moderate	Moderate	Minor	Moderate
Major	Moderate	Moderate	Negligible	Moderate
Major	Moderate	Minor	Minor	Moderate
Major	Moderate	Minor	Negligible	Moderate
Major	Moderate	Negligible	Negligible	Moderate
Major	Minor	Minor	Minor	Minor
Major	Minor	Minor	Negligible	Minor
Major	Minor	Negligible	Negligible	Minor
Major	Negligible	Negligible	Negligible	Minor
Moderate	Moderate	Moderate	Moderate	Major
Moderate	Moderate	Moderate	Minor	Moderate
Moderate	Moderate	Moderate	Negligible	Moderate
Moderate	Moderate	Minor	Minor	Moderate
Moderate	Moderate	Minor	Negligible	Moderate
Moderate	Moderate	Negligible	Negligible	Moderate
Moderate	Minor	Minor	Minor	Moderate
Moderate	Minor	Minor	Negligible	Moderate
Moderate	Minor	Negligible	Negligible	Minor
Moderate	Negligible	Negligible	Negligible	No disturbance effect
Minor	Minor	Minor	Minor	Moderate
Minor	Minor	Minor	Negligible	Minor
Minor	Minor	Negligible	Negligible	Minor
Minor	Negligible	Negligible	Negligible	No disturbance effect
Negligible	Negligible	Negligible	Negligible	No disturbance effect

**Source: Jacobs 2021*

Access

Community accessibility and severance

16.6.25 Accessibility relates to the ability of users to access commercial properties, community land and assets, recreational resources and residential properties. Reduced accessibility can result in community severance i.e. a reduction in the ability of community members to move around their community to access facilities and resources.

16.6.26 The accessibility and severance assessment will follow the sensitivity and magnitude criteria from DMRB LA 112 - Population and Human Health Guidance[423]. As per this guidance, sensitivity will be defined based on the number of existing assets, the number of alternatives and level and frequency of use. Whilst magnitude will be determined based on the degree of loss or damage to key characteristics, features or elements and the level of severance.

16.6.27 The accessibility assessment will draw on the outputs of the Traffic and Transport assessment to determine how changes in transport flows, parking provision, public transport services, Walker, Cyclist and Horse Rider (WCH) provision, as well as Thames navigation may impact the ability of users to access commercial and community assets in the study area. The needs of different user types will be considered including protected characteristic groups (e.g. older people, young people, disabled people), as well as the type of facility (e.g. hospitals or employment hubs) and whether there are alternative facilities available.

Land take

16.6.28 Direct land take impacts can lead to a temporary or permanent restriction in the ability of a user to use a property or facility, in turn this can affect the operation and commercial viability of that property or facility.

16.6.29 Receptors to be considered in the land-take assessment include community, residential and commercial receptors. Land take impacts on recreational receptors will be considered in the recreation assessment.

16.6.30 The land take assessment will follow the sensitivity and magnitude criteria from DMRB LA 112 Population and Human Health.

16.6.31 An assessment of individual receptors will be conducted for each instance of direct land take and GIS mapping will be used to inform the magnitude of effect on a receptor. This will involve evaluating proposed design and mitigation measures to determine potential impact magnitude. While desktop studies will be prioritised, engagement with affected businesses and property owners, or benchmarking with similar projects may be necessary to accurately assess potential changes.

Recreation

16.6.32 The assessment of effects on recreation considers changes to the access, quality, or quantity of recreational opportunities. These changes can be positive or negative and may impact individuals, groups, or communities.

16.6.33 Recreational receptors will be identified through a combination of desk-based research and field surveys. Desk-based research will utilise GIS data and information from local authorities to pinpoint recreation grounds, playgrounds, public rights of way and other relevant facilities.

16.6.34 To enhance understanding of recreational patterns, surveys have commenced and will be conducted through to June 2025. These surveys will include questionnaires for community groups and clubs, in-person interviews with recreational users, and observational studies to capture activity types and user numbers.

16.6.35 Additional sources to help identify receptors dependent on the amenity of the River Thames include:

- Recreational stakeholder groups engaged as part of the ongoing River Stakeholder Forum consultation
- Port of London Authority – for details of business and organisations holding permits for use of the River Thames
- Environment Agency lock keeper and Port of London Authority sluice operator
- Google maps and other online mapping sources

16.6.36 The sensitivity of identified recreational receptors will be considered based on their significance to the local community and level of use. Factors such as the rarity of a resource, its importance for specific user groups, and the potential for alternative recreational opportunities will be considered.

16.6.37 To determine the potential magnitude of impacts on recreational receptors, a spatial analysis will be conducted to identify those resources likely to be affected by the project. Information on the usage of these resources will then be used to understand the potential scale of impact on affected populations and communities.

16.6.38 The significance of identified impacts will be evaluated based on a combination of receptor sensitivity and impact magnitude as per the significance matrix in Chapter 5 EIA Methodology.

16.6.39 Consideration will also be given to cumulative effects. The methodology for the assessment of cumulative effects is provided in Chapter 19 Cumulative Effects.

16.7 Mitigation

16.7.1 The Project will seek to avoid direct impacts on communities by selecting shaft, intake and outfall locations that are not in close proximity to human receptors to the degree practicable. However, given the built-up nature of the surrounding area, impacts on open spaces used by the community are likely to be unavoidable. As such this chapter will undertake a detailed assessment of likely significant effects and will identify mitigation measures for both the construction and operation phase.

16.7.2 During construction, diversions will be implemented for PRoW to ensure a degree of accessibility is maintained.

16.7.3 Additionally, mitigation measures proposed within the other relevant EIA aspects listed below will reduce potential impacts on communities:

- Chapter 6 Air Quality
- Chapter 7 Noise and Vibration
- Chapter 12 Townscape and Visual Amenity
- Chapter 13 Water Resources and Flood Risk
- Chapter 14 Human Health
- Chapter 17 Waste and Materials, and
- Chapter 18 Traffic and Transport

16.7.4 Consideration will be given to opportunities to create lasting legacy benefits in education, recreation, community, and amenity during project operation. The potential to enhance the health and wellbeing of the local community, aligned with local policies and strategies, and to promote equality of opportunity for equality groups will also be explored.

16.8 Summary of Scope for the EIA

16.8.1 A summary of the assessment methodology and aspect scoped in or out of the ES is provided in Table 16.5.

Table 16.5 Summary of the assessment methodology and scope for socioeconomics, community access and recreation

Aspect	Construction	Operation	Rationale
Socioeconomic: Employment	IN	OUT	Construction of the Project will employ a workforce and could therefore impact on employment levels. General operation activities are expected to be undertaken by existing Thames Water employees and the numbers would be expected to be low. Any employment generation that could be directly attributed to the operation of the project would be minimal and represent a 'no change' or 'no impact' scenario.
Socioeconomic: Economy	IN	IN	During construction, the change in economic activity resulting from the Project's expenditure could be large enough to impact on GVA of the local and regional economy. During operation, whilst there will be limited direct spend associated with the operation of the Project the wider economic benefits of drought resilience are recognised and therefore scoped in.
Socioeconomic: Skills and Education	IN	OUT	Construction of the Project could provide opportunities for upskilling and educational opportunities for the local population. Any employment generation, and therefore skills development opportunities, that could be directly attributed to the operation of the Project would be minimal and represent a 'no change' or 'no impact' scenario.
Community: Community amenity	IN	IN	Construction and operation of the Project could affect amenity of

Aspect	Construction	Operation	Rationale
			residential, community and commercial receptors.
Access: Accessibility and Severance	IN	IN	Construction of the Project could affect the ability of users to access commercial facilities, community facilities, recreational resources, and residential properties. During operation, there is potential for adverse effects for users of the Tideway, due to changes in water levels affecting navigation.
Access: Land Take	IN	OUT	Construction of the Project could involve temporary and permanent direct land take impacts on community and commercial receptors. No significant land take effects are expected during operation.
Recreation	IN	IN	Construction of the Project could affect recreational receptors in the River Thames and around the works areas at the intermediate shaft and Burnell Avenue. Operation of the Project could affect the recreational use of the Tideway through navigational impacts from water level changes.

17 Waste and Materials

17.1 Introduction

17.1.1 This chapter presents the results of the Waste and Materials scoping assessment undertaken for the Project in accordance with Institute of Environmental Management and Assessment (IEMA) guide to Materials and Waste in Environmental Impact Assessment (EIA)[424] and other relevant guidance set out within this chapter.

17.1.2 Specifically, this chapter of the EIA Scoping Report determines whether the waste and materials matters associated with constructing and operating the Project are likely to result in significant adverse environmental effects. Where it is determined that they are and it is advised to scope them in, the chapter will define the level of detail to be provided in the EIA and the methodology for the assessment.

17.1.3 The assessment of materials considers the use of material resources and the generation and management of waste. It does not include the direct energy use associated with operation of the Project, this is covered in Chapter 15 Carbon and Climate Change. Material resources include the materials and construction products required for implementation of the Project, both in terms of raw materials and manufactured items.

17.1.4 This chapter should be read in conjunction with the description of the Project as presented in Chapter 2 The Project. Supporting information can be also found in Chapter 11 Ground Conditions and Contaminated Land.

17.2 Consultation and Engagement

17.2.1 Non-Statutory Public Consultation was undertaken from October 2023 to December 2023 to seek feedback about the site options for the Project from variety of people such as landowners, residents, businesses, local authorities, and other statutory bodies who might be affected by or interested in the Project. In relation to waste and materials the responses tended to be general, relaying potential concerns about waste transport and removal during construction and the sustainable reuse of excavation arisings.

17.2.2 An engagement session with Local Planning Authorities (LPAs) of Hounslow, Kingston upon Thames and Richmond upon Thames was held on 8 August 2024, where proposed baseline, scope and methodology of waste and materials assessment were discussed. No comments were raised during the meeting and none have been received since.

17.2.3 Comments will continue to be sought from consultees such as the Environment Agency and local waste authorities, through the planning process and development of the Project.

17.3 Legislation and Policy Review

17.3.1 Key policy relevant to materials and waste set out in the National Policy Statement (NPS) for Water Resources Infrastructure[425] includes:

- Paragraph 4.12.6 requires the applicant to set out the arrangements that are proposed for managing any waste produced in the application for development consent and prepare a Site Waste Management Plan (SWMP) and Materials Management Plan (MMP) where relevant. These should include information on the proposed waste recovery and disposal systems, and the alternatives that have been considered
- Paragraph 4.12.7 requires the applicant to demonstrate that waste will be managed in accordance with their duty of care requirements as a waste producer and the waste hierarchy and that, during construction, excavated soil, subsoil and rock will, where feasible, be reused as per the Soil Resource Plan (SRP)
- Paragraph 4.10.16 requires the applicant to identify and assess any impacts the proposed project may have for mineral safeguarded areas (or other minerals supply aspects) with the relevant Mineral Planning Authority
- Paragraph 4.10.28 indicates that where the development has an impact on a mineral safeguarding area, the Secretary of State (SoS) must ensure that the applicant has put forward appropriate mitigation or compensation measures to safeguard mineral resources

17.3.2 In addition to the policy set out in the NPS for Water Resources Infrastructure, the Project would also have regard to other relevant legislation, policy and guidance for this aspect as listed in Table 17.1.

17.3.3 A detailed summary of the legislative, policy and guidance framework for this aspect, and how it accords with the Project, would be provided in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES).

Table 17.1 Relevant legislation, policy and guidance

Relevant legislation, policy and guidance
Legislation
Environment Act 2021 (as amended*)
Environmental Protection Act 1990 (as amended*)
The Environmental Permitting (England and Wales) Regulations 2016 (as amended*)

Relevant legislation, policy and guidance
The Waste (England and Wales) Regulations 2011 (as amended*)
Hazardous Waste (England and Wales) Regulations 2005 (as amended*)
NPS for Water Resources Infrastructure[426]
National policy
NPS for Water Resources Infrastructure 2023[427]
The National Planning Policy Framework (NPPF)[428]. It is noted that the NPPF (2024) was under consultation until September 2024
National Planning Policy for Waste[429]
National Planning Practice Guidance on Waste[430]
Waste Management Plan for England[431]
Environmental Improvement Plan 2023[432]
Government Review of Waste Policy in England 2011[433]
Resources and Waste Strategy for England[434]
Waste prevention programme for England: Maximising Resources, Minimising Waste (2023)
Regional policy
The London Plan 2021[435]
Local policy
The London Borough of Hounslow (LBH) Local Plan 2015-2030[436] and the LBH Local Plan 2020 - 2041 (emerging policy)
The London Borough of Richmond upon Thames LBR Local Plan 2015 - 2018[437] and the LBR 'Pre-Publication' Draft Local Plan (2024)[438]
The Royal Borough of Kingston upon Thames (RBK) Core Strategy 2012[439] and Kingston's Local Plan 2019 - 2041 (Regulation 18) (emerging policy)[440]
West London Waste Plan, Adopted July 2015[441]
South London Waste Plan, Adopted December 2022[442]
Guidance
IEMA guide to Materials and Waste in EIA[443]
*As amended by The Waste (Circular Economy) (Amendment) Regulations 2020

17.3.4 Regulation 5(2)(d) of The Infrastructure Planning Environmental Impact Assessment Regulations 2017 (EIA Regulations) requires significant effects on waste and material assets to be considered, as appropriate, within the EIA process.

17.4 Existing Environment and Baseline Conditions

Study area

17.4.1 Study areas are defined with reference to IEMA guide to: Materials and Waste in EIA[444]. The assessment defines two geographically different (development and expansive) study areas, used to examine the use of primary, secondary, recycled and manufactured materials, and the generation and management of waste.

17.4.2 The development study area comprises all land contained within the Project footprint, so the construction boundary (defined as EIA Scoping Boundary) and areas required for temporary use. Such temporary land use could include temporary access, site compounds, working platforms and other enabling activities. It is understood that within the development study area materials would be consumed, mineral safeguarding sites could be sterilised, and waste would be generated.

17.4.3 The expansive study area includes the availability of construction materials, the capacity of waste management infrastructure and remaining landfill void space. This is considered on a regional (or, where justified, national) basis, within one or more regions as appropriate. The Project is localised in the western part of the London region, which is the assumed place of waste generation and materials consumption during the construction phase. However, due to the urbanised character of the region and lack of waste management sites within, effects may affect the neighbouring region of South East of England – this region is therefore taken into consideration in this assessment and, along with London, they form the expansive study area.

17.4.4 In the context of this chapter, the south east is the region comprising Berkshire, Buckinghamshire, East Sussex, Hampshire, Isle of Wight, Kent, Oxfordshire, Surrey and West Sussex. Respectively, the region of London comprises City of London and Greater London.

Baseline conditions

17.4.5 A desk-based assessment has been undertaken to establish existing baseline conditions. This has been prepared with reference to the following documents, which represent the most recent information available:

- British Geological Survey (BGS) GeoIndex Onshore (2024)[445]

- Environmental Agency (2024): 2022 Waste Data Interrogator[446]
- Kingston's Local Plan. First Draft of the Local Plan Consultation (Regulation 18) 2023[447]
- London Aggregates Working Party: Annual Monitoring Report 2022[448]
- Profile of the UK Mineral Products Industry[449]
- Richmond Local Plan 'The best for our borough' - draft for consultation (Regulation 19) 2023[450]
- South East England Aggregates Working Party: Annual Report 2022[451]
- This is UK Concrete[452]
- The LBH Local Plan 2015-2030[453]
- The London Borough of Kingston upon Thames Core Strategy 2012[454]
- The London Borough of Richmond upon Thames (LBR) Local Plan 2018[455]
- The London Plan[456]
- UK Steel: Key Statistics Guide[457]

17.4.6 The baseline environment for waste and materials comprises the following key receptors:

- Materials availability – regional (or, where justified, national) availability (stocks, production, sales, other) of key construction and operational materials within the expansive study area
- Mineral safeguarding sites – local Mineral Strategic Resource Areas, Mineral Safeguarding Areas and allocated mineral sites within the development study area
- Landfill void capacity – regional (or, where justified, national) availability of inert, non-hazardous and hazardous landfill void capacity within the expansive study area

Materials – baseline conditions

17.4.7 For the purposes of this assessment, material assets are considered to be the physical resources used across the lifecycle the Project, which may be of man-made or natural origin. The exact types and quantities of materials required for the Project are not available with further design development work on-going. However, indicative estimates of materials are presented as part of this assessment.

17.4.8 Materials will be required for the construction of the Project, including the following components: the tunnel and shafts, earthworks at Mogden Sewage Treatment Works (STW), water intake and outfall from/to Thames, Thames Lee Tunnel (TLT) connection, and tertiary treatment plant (TTP). The latest is expected to include electrical and administration buildings, final effluent pumping station, chemical storage tanks and associated ancillary infrastructure.

17.4.9 Based on the nature of the Project and design data from the design team it is expected that key construction materials will include the following:

- Concrete (consisting of aggregates, cement and water)
- Steel

17.4.10 Based on the current design data, indicative quantities of materials required for the construction of the whole Project have been estimated as below:

- Ready-mixed concrete – 54,500t (22,700m3)
- Pre-cast concrete – 36,800t (15,300m3)
- Cement powder – 4,000t
- Steel – 9,800t

17.4.11 During the operation of the Project, small quantities of materials will be required for maintenance works and repairs (batteries, concrete, metals, plastics and such likes), and for the water treatment at TTP. According to the current design, ferric sulphate is expected to be the only chemical required for this process with the estimated usage of 37 m^3/month (provided by two lorry deliveries per month). Furthermore, ferric sulphate is a commonly used material in sewage treatment and there are no known issues with its supply. Additionally, TTP is to be fully operational periodically only during drought conditions, with its operation likely to be typically from August to November and once every two years. The amount of materials needed for the reduced maintenance flow from the TTP are much lower.

Materials – availability

17.4.12 Concrete market is widely known for its established and national supply chain across the UK – *This is UK Concrete*[458] publication states that over 95% of UK concrete is produced in the United Kingdom and that it constitutes a major part of the wider UK mineral products industry.

17.4.13 The latest (2023) edition of *Profile of the UK Mineral Products Industry*[459] presents information on the production of minerals and mineral products in the UK, as shown in Table 17.2. In relation to the expansive study area, the report mentions London and the south east as two regions with the highest ready-mixed concrete sales (5,000,000m^3) – two to three times higher comparing to most of other Great Britain regions.

Table 17.2 Production of minerals and mineral products in the UK 2021 data

UK production of minerals and mineral products, 2021 (Million tonnes)	
Aggregates- total	279.8
Crushed rock	148.2
Sand and gravel – land won	47.7
Sand and gravel - marine	14.3
Recycled/secondary aggregates	69.6
Cementitious materials - total	88.6
Cement	9.0
Other cementitious materials	2.1
Ready-mixed concrete	52.7
Concrete products	24.8

17.4.14 UK Steel publishes reports showing trends in steel production, trade and market across the UK. The latest (2024) edition of the *UK Steel: Key Statistics Guide*[460] provides information that 5.6 million tonnes of crude steel was produced in the UK in 2023.

17.4.15 Although there are no estimates for the aggregates' consumption during the construction and they are not identified as key materials, they are related to concrete production, in terms of both cement (from processed aggregate) and sand.

17.4.16 Mineral Planning Authorities (MPAs) are required to maintain a minimum landbank of seven years for sand and gravel and a minimum landbank of 10 years for crushed rock. This is used to determine whether there is a shortage or surplus of supply in a given minerals planning area.

17.4.17 An Aggregate Working Party (AWP) is the body charged with data collection to facilitate planning by MPAs, national government agencies and the aggregate industry. The latest available report of AWP – Annual Reports[461] provides landbank, sales and reserves data from 2021 (London) and 2022 (South East England), are presented in Table 17.3.

Table 17.3 Aggregate Working Party data for London and South East of England

	London (2021)		South East England (2022)		Total	
	Sand and gravel	Crushed rock	Sand and gravel	Crushed rock	Sand and gravel	Crushed rock
Landbank (years)	4.67	N/A	8	11	8*	11*
Sales (Thousand tonnes)	340	2,590	5,529	2,482**	5,869	5,072
Reserves (Thousand tonnes)	3,270	N/A	52,290	21,647	55,560	21,647

*The highest number of years has been chosen for the total figure to avoid double counting

**3-year sales average; exact 2022 data has been marked a confidential

17.4.18 A metric for estimating recycled and secondary aggregates within the regions is via the assessment of the capacity of licensed Construction, Demolition and Excavation (CDE) handling facilities contained within the Waste Data Interrogator[462]. According to its latest issue, the amount of CDE waste received by permitted facilities was 9.3 million tonnes in the London Region in 2022 with an additional 17 million tonnes in the South East Region. The tonnage of CDE waste removed in the London Region in 2022 was 2.9 million tonnes and 2 million tonnes in the South East Region. It should be noted that not all of the removed/received CDE waste will be aggregates suitable for recycling.

Mineral Safeguarding Areas baseline conditions

17.4.19 According to Hounslow Local Plan 2015-2030[463], there are no Minerals Safeguarding Areas and Allocated Mineral Sites found within the development study area. Richmond upon Thames Local Plan[464] and Kingston Core Strategy[465] do not mention minerals or their safeguarding hence it has been assumed none are present within their boundaries. This is confirmed by Policy SI10 of the London Plan[466], where only four of London boroughs (one of which is Hounslow) are identified to have land-won aggregates within their borders. The Plan also identifies the boroughs as responsible for minerals safeguarding.

17.4.20 Review of the BGS GeoIndex Onshore confirms there are no active mineral sites or quarries within the development study area.

Waste baseline conditions

17.4.21 The Project would potentially produce a range of waste types including inert, non-hazardous and hazardous wastes. A small amount of municipal-type solid waste (food waste, packing and such like) associated with the workers is expected during both construction and operation. Large proportion of the solid waste is likely to be suitable for reuse, recycling or other recovery, although a proportion may also require disposal. Only the indicative waste types and quantities are available at this stage, although this information will be updated as further details from ground investigations and design work develops.

17.4.22 The vast majority of construction wastes assumed to be produced will be excavated waste from the tunnelling process, shafts drilling and site preparation/clearance. Altogether the waste will be CDE waste type.

17.4.23 It is anticipated that within the development study area the excavated material (known as spoil) would be mainly London Clay. Ground investigation work is being undertaken, although no specific details are available at this stage. As set out in Table 11.3 in Chapter 11 Ground Conditions and Contaminated Land, there are historical landfills within close proximity to the development study area. Therefore, if any excavation works were to intersect historical landfill or contaminated land, this would be identified at the next stage (PEI Report) and included within the assessment (the ES).

17.4.24 The volume of bulk excavated waste (spoil) has been based on the current design data and is estimated to be 194,900m^3. It has been assumed the soil volume is negligible in comparison to clay and therefore the majority of the excavated waste is considered to be London Clay.

17.4.25 Excavated waste (spoil) will likely be transported off site as opportunities to reuse it for the construction of the Project are limited, however, further investigation as to on-site uses will be explored. It is yet to be established how the material will be processed, but there is a high probability it will be reused or processed and recycled – as it is a sought-after and valuable material. Examples of clay reuse include ceramics industry, cement production or wider construction purposes. Excavated materials, other than clay, can be reused in various construction schemes, like landfill shaping, embankments or retaining walls. Suitable processing and/or disposal locations will be developed in the next stage of design.

17.4.26 Operational wastes are expected to be generated from occasional maintenance works and repairs, in a form of plastics, metals, waste electrical and electronic equipment (WEEE) and concrete. Carbon air filters within the air management chamber may require a replacement once every three years, units of mechanical cloth filter at the TTP may require replacement

every 10-15 years. Periodic inspections of the tunnels are expected every 10 years.

17.4.27 Filter clearance at the TTP is assumed to be the only regular process generating waste during the operational phase – where sludge from the cleaning of biomass/mechanical cloth filters will be removed. Additional deep cleaning is expected to be carried out annually. Based on the current design information, the quantity of sludge generated during the maximum TTP throughput (75Ml/day) has been estimated as 3.5t/day. It has to be noted though, that the TTP will be operational sporadically, typically only for a few months every two years, and the maximum throughput is expected only during drought conditions. During non-drought periods the TTP would operate at the maximum flow of 15Ml/day to maintain the biomass, so a maximum of 0.7t of sludge would be generated daily.

17.4.28 Sludge is a valuable by-product of wastewater treatment process and Thames Water has a well-established route of processing it, mainly via anaerobic digestion – which is considered a beneficial reuse. It is considered unlikely that the sludge from TTP would require disposal at a landfill site – it will be most probably treated on site at Mogden STW as there are already anaerobic digestors in place.

Waste infrastructure - transfer, treatment, recycling and incineration

17.4.29 The availability of waste transfer, treatment, recycling and recovery infrastructure, able to accept waste likely to be generated, has been considered through a review of Waste Management 2022: Data Tables[467] for London and South East of England (expansive study area).

17.4.30 Whilst annual capacity data are published by the Environment Agency for both landfill and incineration facilities at the national, regional and sub-regional level, no annual capacity data are published by the Environment Agency for waste transfer, treatment or recycling sites. Only annual throughput is published for these facilities. Table 17.4 below provides information on the annual throughput for different facilities.

Table 17.4 Annual permitted throughput or capacity of transfer, treatment, recycling and incineration in London and South East of England

Site type	London (000s tonnes)	South East (000s tonnes)	Total (000s tonnes)
Transfer (annual throughput)			
Hazardous waste transfer stations	657	682	1,339
Household, industrial, commercial waste transfer stations	4,914	4,082	8,996
Non-biodegradable waste transfer stations	816	212	1,028
Treatment and metal recycling (annual throughput)			
Material recovery	1,556	2,031	3,587
Physical treatment	4,835	6,720	11,555
Physico-chemical treatment	321	297	618
Chemical treatment	-	7	7
Composting	168	676	844
Biological treatment	696	2,209	2,905
Metal recycling	896	583	1,479
Incineration (annual capacity)			
Hazardous waste	-	58	58
Co-incineration of non-hazardous waste	-	-	0
Municipal and/or industrial and commercial incineration	1,948	3,470	5,418
Biomass/waste wood incineration	-	332	332

17.4.31 Based on the above, it can be assumed that there will be opportunities for waste arisings to be transferred, treated, recycled or recovered as appropriate, if they cannot be reused, recycled or otherwise recovered on-site. Notwithstanding, the available waste transfer, treatment, recycling and recovery infrastructure is considered as beneficial in that this management

will move waste up the waste hierarchy. These facilities are therefore not considered to be receptors for the purposes of assessment in the same way as landfills, given that they have the potential to reduce the magnitude of adverse impacts associated with waste generation and disposal.

Waste infrastructure - disposal

17.4.32 For wastes which cannot be reused, recycled or otherwise recovered, disposal to landfill will be required. The Waste Management Data Tables[468] detail the total remaining landfill capacity in London and South East of England in 2022, as presented in Table 17.5.

Table 17.5 Landfill capacity available in London and South East of England, 2022

Landfill type	London (000s cubic metres)	South East (000s cubic metres)	Total London and South East Regions (000s cubic metres)
Hazardous merchant landfill	0	92	92
Hazardous restricted landfill	0	173	173
Non-hazardous landfill with SNRHW cell*	0	10,799	10,799
Non-hazardous landfill	4,336	17,582	21,918
Non-hazardous restricted landfill	0	0	0
Inert landfill	1,652	20,358	22,010
Total	5,988	49,004	54,992

Waste – forecast of landfill capacity

17.4.33 IEMA guidance requires an assessment to consider the potential impact of waste by forecasting regional landfill capacity up to construction finalisation (opening year) of a project.

17.4.34 Inert landfill capacity has been chosen as an indicator for assessing waste effects at the scoping stage, as it is expected that inert waste (mainly excavated materials) will be the most significant waste stream generated by the Project. Additionally, estimated quantities of excavated material (spoil) have been provided by the design team what allows to compare them to the forecasted inert landfill void and assess the effects. It is also treated as the worst-case scenario to not include capacity of non-inert landfills. Nonetheless, they will be included and analysed at the EIA stage, where more precise data will be available.

17.4.35 The predicted changes in landfill capacity have been derived from the existing *2022 Waste Data Interrogator*[469] time-based data (which has analysed the remaining landfill capacity trend between 2004 and 2022, and excluded the two most extreme changes). These data have been projected forward to 2033 (targeted opening year), using the calculated average annual capacity change in inert landfill in London (16.2% increasing capacity) and the South East (0.7% increasing capacity) in order to provide an estimate of the remaining landfill void that may be available during the construction.

17.4.36 Landfill void capacity is generally expected to be decreasing over time due to the continued waste disposal. However, Minerals and Waste Planning Authorities are responsible to plan for new capacity through expanding the existing landfill sites and permitting of new ones. This is likely the reason for the increasing trend of inert landfill capacity in the combined regions of London and the South East of England. Forecast information on landfill capacity for London and the South East of England is set out below in Table 17.6.

Table 17.6 Inert landfill capacity forecast for London and South East of England

Year	Forecasted inert landfill capacity (000s cubic metres)	
	London	South East England
2029	4,718	21,348
2030	5,481	21,493
2031	6,368	21,640
2032	7,397	21,787
2033	8,594	21,935
Average capacity during construction (2029-2033)	6,512	21,641
Combined average capacity during construction period		28,152

17.4.37 Similarly, the predicted changes in non-inert and restricted user landfill capacity have been projected forward to 2036 in order to provide an estimate of the remaining landfill void that may be available during the first three years operation (as required by the IEMA guidance). This has been forecasted using the calculated average annual capacity change (excluding the two most extreme changes) in non-inert landfill (2.2% increasing capacity in London, 6.8% decreasing capacity in the South East) and

restricted user landfill (20.6% increasing capacity in the South East, lack of such in London). The results are shown in Table 17.7.

17.4.38 Outstanding restricted user landfill capacity trend (20.6%, increasing) is likely caused by the number of new sites opened through the time.

17.4.39 Non-inert and restricted user landfill capacity have been chosen as a sensitive factor for operational waste generation as the sludge would likely be transferred there if disposal is required.

Table 17.7 Inert landfill capacity forecast for London and South East of England

Year	Forecasted landfill capacity (000s cubic metres)		
	London	South East England	
	Non-inert	Non-inert	Restricted user
2034	5,655	12,161	1,646
2035	5,782	11,328	1,985
2036	5,911	10,553	2,395
Average capacity during first 3 years of operation (2034-2036)	5,783	11,347	2,008
Combined average capacity during first 3 years of operation			19,138

17.5 Sensitive Receptors and Potential Environmental Effects

17.5.1 In the context of this chapter, sensitive receptors are landfill capacity for waste, and consumption of the materials themselves. Mineral Safeguarding Areas have been scoped out and are therefore not considered as a sensitive receptor furthermore. Potential impacts and effects on the two sensitive receptors (materials and waste) caused by the Project are shown in the Table 17.8 below.

Table 17.8 Impacts and effects on waste and materials

Element	Direct impacts	Adverse effects	Indirect impact
Materials	Consumption of resources	Depletion of resources, resulting in the temporary or permanent degradation of the natural environment.	Release of greenhouse gas emissions (through transportation). Water consumption. Visual impacts, noise, vibration, disruption to traffic and other potential causes of nuisance. Human health, e.g. if conflict minerals are used.
Waste	Generation and disposal of waste	Reduction in landfill capacity. Unsustainable use or loss of resources to landfill that results in the temporary or permanent degradation of the natural environment.	Release of greenhouse gas emissions (through transportation and management). Ecological impacts (e.g. necessity to open new landfill sites). Visual impacts, noise, vibration, disruption to traffic and other potential causes of nuisance.

Materials – construction

17.5.2 Due to the nature of the Project, key materials required for its construction would include concrete (produced from aggregates, water and cement) and steel. These are likely to be secondarily sourced and with a high recycled content.

17.5.3 The concrete market in the UK is generally stable and well-supplied, and it is not expected that the construction of the Project would cause any disturbance. Estimated tonnage of the ready-mixed concrete required for construction constitutes less than 0.5% of the annual ready-mixed concrete sales in the expansive study area. Comparing to the UK-wide ready-mixed concrete production, it is only 0.1%. Estimated tonnage of the pre-cast concrete also constitutes 0.1% of the national production and for the cement powder it is even less than 0.05%.

17.5.4 Estimated tonnage of steel required for the construction constitutes 0.2% of the national UK production and is not expected to cause any disturbance on the steel market.

17.5.5 The latest reports from Mineral Planning Association and AWP[470] demonstrate there is sufficient aggregates availability – both regionally, and nationally.

17.5.6 Furthermore, no Mineral Safeguarding Areas have been identified within the development study area and the Project would not likely sterilise any mineral resource in its entirety (see paragraph 17.4.18 for more details).

17.5.7 It is therefore recommended that impacts from construction materials are scoped out of the waste and materials assessment on the basis that the influence market of key materials (concrete, steel and aggregates) would be negligible and therefore no likely significant effects would be realised.

Materials - operation

17.5.8 The IEMA guide to Materials and Waste in EIA[471] specifies that the assessment should only report on one full and representative year of the first three years of operational activities. It has been assumed that no significant maintenance, repair or operational activities would occur during that period of time, and thus no significant material assets consumption is likely to be realised then. Operational need for materials at the new TTP at Mogden STW proposed in the Project is of a similar nature to the existing facility (waste water treatment) and there is only one material type (ferric sulphate) required for the process. During the expected four months of operation per every two years, there would be only 148m^3 (8 lorry deliveries) of ferric sulphate required for operation of the TTP and this would be reduced during the period when the TTP is in maintenance mode (generating around 20% of full operational flow).

17.5.9 It is therefore proposed that impacts from operational materials are scoped out of the assessment on the basis that no likely significant effects would be realised during any of the first three years of the operation. Based on professional judgement, the demand for the ferric sulphate is considered low and without any potential to influence the relevant market.

Waste – construction

17.5.10 At this stage of the Project development, potential effects of construction waste and their significance are uncertain to assess. If the whole currently estimated volume of spoil (the main waste stream) required disposal, it would reduce the forecasted regional inert landfill capacity (construction period average) by 0.7% (194,900m^3/28,152,000m^3). This would result in non-significant effects, as defined by the IEMA methodology in section 17.6. Nonetheless, the design keeps evolving, changes are expected and exact opportunities to reuse/recycle/recover spoil and its characteristics (including potential contamination or crossing a historic landfill site) are yet to be

determined. Additionally, the details and tonnages of all expected waste types are not available at this stage and there are likely limited opportunities to reuse waste on site. Non-inert landfill capacity will be forecasted at the next stage, where more detailed waste data will be available. It is therefore proposed to scope in impacts from construction waste.

17.5.11 As indicated in Chapter 5 EIA Methodology, any activities associated with decommissioning are to be scoped out of the assessment.

Waste - operation

17.5.12 The IEMA guide to Materials and Waste in EIA[472] specifies that the assessment should only report on one full and representative year of the first three years of operational activities. Sludge is the only waste type expected to be produced on a regular basis and the TTP is projected to typically be operational from August to November only once every two years. Considering the worst-case scenario where the TTP would be operating at maximum throughput 75Ml/day during full four months and at 15Ml/d during the remaining eight months, it would result in producing 590t of sludge throughout a year. If all the annual sludge required disposal, it would alter the combined non-inert and restricted user landfill capacity in the second study area only by 0.003% (assumed sludge density 1t/m^3). This is considered negligible and not posing a threat to result in significant effects. What is more, there is pre-existing sludge treatment process in place at Mogden STW and it is likely that only a small proportion of sludge would be landfilled if any.

17.5.13 Additionally, it has been assumed that no significant maintenance or repair activities would occur during first three years of operation, and thus no significant waste generation is likely to be realised during this period. It is therefore proposed that impacts from operational wastes are scoped out of the assessment on the basis that no likely significant effects would be realised.

17.5.14 Following the methodology set out in the IEMA guide to Materials and Waste in EIA[473] and analysing the available information, it is proposed to scope out certain aspects from further assessment. Details and justification are set out above and included in the Table 17.15 at the end of the chapter.

17.6 Assessment Methodology

17.6.1 The methodology to be applied is based on the IEMA guide to Materials and Waste in EIA[474], utilising two geographically different study areas to examine the generation and management of waste.

17.6.2 Waste management and processing infrastructure that is used to recover waste arisings and as a result divert them from landfill is considered here as

a factor reducing the magnitude of waste impacts. Therefore, they are not a sensitive receptor in the context of the assessment.

17.6.3 The magnitude of impact is to be assessed for the construction phase only, as the operational waste generation is proposed to be scoped out. Construction is considered from the point of gaining the site access, site preparation including any site remediation, enabling works, and construction, up to the commissioning.

Assessment sensitivity

17.6.4 The sensitivity of waste is defined by the availability of regional/national landfill void capacity in comparison to the absence of the Project. Landfill capacity is recognised as an unsustainable and increasingly scarce option for managing waste. The following two-steps process will be applied.

- Expected volumes of waste
  This includes calculation of the expected volume of waste for disposal to be generated within the defined study area. This forecast should be conducted using available data up to the end of the expected construction period
- Comparison to void capacity
  The volume of forecast waste for disposal within the expansive study area (as calculated in Step 1) should be compared to the remaining void capacity, which allows the determination of the expected reduction in available infrastructure capacity

17.6.5 To determine the sensitivity of landfill void capacity, the following scales from Table 17.9 and Table 17.10 will be applied – separately for inert and non-hazardous, and for hazardous landfill.

*Table 17.9 Assessment on sensitivity of landfill void capacity in the absence of the Project, inert and non-hazardous waste**

Negligible	Low	Medium	High	Very high
Landfill void capacity is expected to remain unchanged, or is expected to increase through a committed change in capacity	Landfill void capacity is expected to reduce minimally: by < 1% as a result of wastes forecast.	Landfill void capacity is expected to reduce noticeably: by 1-5% as a result of wastes forecast.	Landfill void capacity is expected to reduce considerably: by 6-10% as a result of wastes forecast.	Landfill void capacity is expected to reduce very considerably (by > 10%); end during construction or operation; is already known to be unavailable; or, would require new capacity or infrastructure to be put in place to meet forecast demand.

**Source: IEMA Materials and Waste in EIA, 2020*

17.6.6 The hazardous waste infrastructure within England will be used to assess likely significant effects of hazardous waste generated by the Project due to the limited hazardous waste landfill capacity within London and South East of England regions. Given the limited hazardous landfill capacity within the expansive study area it is likely that hazardous waste would need to be disposed of outside the study area.

Table 17.10 Assessment on sensitivity of landfill void capacity in the absence of the Project, hazardous waste

Negligible	Low	Medium	High	Very high
Landfill void capacity is expected to remain unchanged, or is expected to increase through a committed change in capacity	Landfill void capacity is expected to reduce minimally: by < 0.1% as a result of wastes forecast.	Landfill void capacity is expected to reduce noticeably: by 0.1 – 0.5% as a result of wastes forecast.	Landfill void capacity is expected to reduce considerably: by 0.5 – 1% as a result of wastes forecast.	Landfill void capacity is expected to reduce very considerably (by > 1%); end during construction or operation; is already known to be unavailable; or, would require new capacity or infrastructure to be put in place to meet forecast demand.

Assessing magnitude

17.6.7 The IEMA guidance offers two possible methods for conducting the assessment on waste and the decision as to which is chosen is to be based on professional judgement, the scale and nature of the development and data availability. Those methods should not be combined.

17.6.8 For this assessment, the decision regarding methodology selection (W1 or W2 – see below) would be made at the EIA assessment stage, based on the available data at the time of the assessment. Method W1 is more likely to be selected, as it is based on the waste quantities generated by the Project. Methody W2 requires information of landfill diversion rates, which are usually not possible to determine with confidence at PEI Report or ES stage.

Method W1 – void capacity

17.6.9 Using this method, impacts of the development are assessed by determining the percentage of the remaining landfill capacity that will be reduced by waste produced during the construction/operation of the Project. There are two separate scales to determine the magnitude of impacts, one for inert and non-hazardous waste, and the second one for hazardous waste. Both are presented in Table 17.11 and Table 17.12 below.

Table 17.11 Void Capacity method - environmental effects of inert and non-hazardous waste

No change	Negligible	Minor	Moderate	Major
Zero waste generation and disposal from the development.	Waste generated by the development will reduce regional* landfill void capacity baseline** by < 1%.	Waste generated by the development will reduce regional* landfill void capacity baseline** by 1-5%.	Waste generated by the development will reduce regional* landfill void capacity baseline** by 6-10%.	Waste generated by the development will reduce regional* landfill void capacity baseline** by > 10%.
* Or, where justified, national. (Note we shall use the two regions (London and South East of England, as defined in the expansive study area). ** Forecast as the worst-case scenario, during a defined construction phase				

Table 17.12 Void Capacity method - environmental effects of hazardous waste

No change	Negligible	Minor	Moderate	Major
Zero waste generation and disposal from the development.	Waste generated by the development will reduce national landfill void capacity baseline* by < 0.1%.	Waste generated by the development will reduce national landfill void capacity baseline* by < 0.1 – 0.5%.	Waste generated by the development will reduce national landfill void capacity baseline* by < 0.5 – 1%.	Waste generated by the development will reduce national landfill void capacity baseline* by > 1%.
* Forecast as the worst-case scenario, during a defined construction and/or operational phase				

Method W2 – landfill diversion

17.6.10 Using this method, developments are compared to a good practice landfill diversion rate of 90% to determine magnitude of impact. Impacts and effects of inert, non-hazardous, and hazardous wastes should be evaluated separately. The possible outcomes of the evaluation are presented in the Table 17.13 below.

Table 17.13 Landfill Diversion method - environmental effects of waste

No change	Negligible	Minor	Moderate	Major
In construction and/or operation, a development is expected to achieve 100% landfill diversion.	In construction and/or operation, a development is expected to achieve 90-99% landfill diversion.	In construction and/or operation, a development is expected to achieve 60-89% landfill diversion.	In construction and/or operation, a development is expected to achieve 30-59% landfill diversion.	In construction and/or operation, a development is expected to achieve < 30% landfill diversion.

Determining a significance

17.6.11 To determine whether an effect is significant or not, first the effect threshold should be established, where the sensitivity and magnitude are put together to determine the effect itself. An example effect threshold is presented in the Table 17.14 below. The pre-mitigation scenario should consider primary (inherent/embedded) and tertiary (inexorable/good practice) mitigation, while the post-mitigation scenario should also include secondary (foreseeable) mitigation that has been identified and committed to through environmental assessment.

Table 17.14 Example effect threshold to be used in EIA

	Magnitude of impact					
Sensitivity (or value) of receptor		No change	Negligible	Minor	Moderate	Major
	Very high	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

17.7 Mitigation

17.7.1 The design of the Project has not been sufficiently developed to allow mitigation measures to be defined in detail. This section, therefore, identifies established and reliable design, mitigation and enhancement measures considering relevant legislation, policy and good practice.

17.7.2 These measures will be developed and detailed during subsequent stages as more information becomes available. Embedded mitigation would be developed as the design progresses, as it is an intrinsic part of every development.

17.7.3 Mitigation measures would be included in the design and during the construction of the Project. The design for the Project would aim to follow the waste hierarchy by reducing waste generation, increasing the recycling or recovery of waste where feasible, and reducing where possible the need for waste disposal. Imported materials should have high recycled content wherever possible (when allowed by design/safety requirements).

17.7.4 As the earthworks and spoil generation is unavoidable due to the nature of the Project, potential ways to manage and reuse that material on-site and at other developments in a close proximity to the site, would be considered and analysed. Where it is not possible to reuse the material locally, other sites, at greater distances, requiring material for beneficial use would be considered and analysed.

17.7.5 Although the Site Waste Management Plan Regulations 2008 were revoked on 1 December 2013, the production of a Site Waste Management Plan is still regarded as good practice during construction, and an effective tool to achieve the most sustainable outcome in terms of waste and materials management.

17.7.6 Potential measures that can be taken to reduce waste arisings during construction include:

- Segregating all arisings on site
- Identifying reusable materials on site for use on site, storage or resale
- Importing materials with high recycled content
- Removing recyclable and recoverable materials from site to be processed by licensed facilities
- Using surplus recycling or recovered materials in local community projects, e.g. utilising recycled mulch from tree felling at community facilities
- Recycling suitable materials from construction of noise/landscape bunding

17.8 Summary of the Scope for the EIA

17.8.1 In summary, following the methodology set out in the IEMA guide to Materials and Waste in EIA[475] and analysing the available information, the decision has been made to scope out certain aspects from further assessment. Details and justification are included in Table 17.15 below and in relevant paragraphs of sections 17.3.

Table 17.15 Summary of the proposed scope of the EIA

Category	Phase	Factor	Baseline	Potential effect Scoped In/Out
Materials	Construction and Operation	Allocated Mineral Site	No allocated mineral sites within or close to the primary study area.	OUT
		Material availability	Sufficient material availability within the regions of London and South East of England. Expected high recycled content and low use of primary resources due to the nature of the Project. During operation minimal material input will be required, mainly in a form of chemicals required for the treatment process, which are of similar nature to existing requirements.	OUT
Waste	Construction	Void landfill capacity and expected waste arisings	Although there is sufficient capacity of regional landfills to accept inert waste from construction site, waste arisings (other than excavated waste volume) are yet to be estimated and may influence regional waste infrastructure. Inert waste arisings are expected to be the primary type of waste generated as a result of construction activities. There is no need for excavated spoil material to be reused on site and therefore appropriate method of disposal or	IN

Category	Phase	Factor	Baseline	Potential effect Scoped In/Out
			alternative reused should be proposed. There is also a possibility the Project will go through historical landfill area and as a result more waste of unknown nature may be generated.	
	Operation	Void landfill capacity and expected waste arisings	No significant waste arisings are expected during operational phase.	OUT

18 Traffic and Transport

18.1 Introduction

18.1.1 This chapter of the Environmental Impact Assessment (EIA) Scoping Report sets out the EIA's proposed scope and methodology in relation to vehicle movement impacts associated with The Project's construction, operation, and maintenance. It should be read in conjunction with the description of the Project as presented in Chapter 2. Environmental impacts relating to these movements have the potential to affect a range of receptors, transport users and modes.

18.1.2 The effects considered in this chapter should be read in conjunction with the following chapters, which also address potential environmental effects that are related to Traffic and Transport:

- Chapter 6 Air Quality
- Chapter 7 Noise and Vibration
- Chapter 14 Human Health, and
- Chapter 16 Socioeconomic, Community, Access and Recreation

18.2 Consultation and Engagement

18.2.1 Non-Statutory Public Consultation was undertaken from October 2023 to December 2023 to seek feedback about the site options for the Project from variety of people such as landowners, residents, businesses, local authorities, and other statutory bodies who might be affected by or interested in the Project. Pipe-jacking was the proposed construction method and design at the time of the consultation. Regarding traffic and transport, several concerns were raised, particularly about construction congestion, safety issues, and the impact of heavy goods vehicles (HGVs) on local roads and transport infrastructure, especially near Ham. These concerns have since been considered in the latest design developments, given that the Tunnel Boring Machine (TBM) method has now been proposed, which addresses and changes the geographical distribution and intensity of transport impacts during construction. These details can be found in section 2.2 of Chapter 2 The Project in this EIA Scoping Report.

18.2.2 On 8 August 2024, a further engagement occurred with representatives from London Borough of Richmond upon Thames (LBR), Royal Borough of Kingston Upon Thames (RBK), and London Borough of Hounslow (LBH). The Project team outlined the description of the current Project, the affected road network, the likely traffic impacts in their boroughs, and likely mitigation measures to be considered.

18.2.3 The Project is also consulting Transport for London (TfL) concerning the likely traffic impacts on their road network. The Transport for London Road Network (TLRN), which also captures Greater London Authority (GLA) roads, is a road network asset in Greater London managed by TfL, whilst other Major Road Networks (MRNs) are managed by their respective local planning authorities and the Strategic Road Network (SRN).

18.3 Legislation and Policy Review

18.3.1 There is no legislation specific to the environmental assessment of traffic and movement and associated effects.

18.3.2 The National Policy Statement (NPS) for Water Resources Infrastructure[476] is the key policy document for infrastructure including water treatment facilities.

18.3.3 The NPS includes a set of guidelines to be considered when assessing the effects from Traffic and Movement. These are outlined in the NPS paragraphs 4.14.1 to 4.14.16 and summarised below.

- Paragraph 4.14.5 states that, '*If a project is likely to have significant transport implications, the applicant's Environmental Statement should include a transport appraisal…*'
- Paragraph 4.14.6 requires applicants to, '*…consult National Highways, Network Rail and Highway Authorities as appropriate…*'
- Paragraph 4.14.7 requires applicants to, '*…Prepare a construction management plan for construction stages and a travel plan for the operational stage of the infrastructure. Both should include demand management and monitoring measures to mitigate transport impacts*'
- Paragraph 4.14.8 suggests that, '*The assessment should also consider any possible disruption to services and infrastructure (such as road, rail, and airports)*'
- Paragraph 4.14.9 outlines that, '*If additional transport infrastructure is needed or proposed, it should always include good quality walking, wheeling and cycle routes, and associated facilities (changing/storage etc.) needed to enhance active transport provision*'
- Paragraph 4.14.12 details the requirements that could be included as possible demand management measures, such as, '*reduce the need to travel by consolidating trips', 'provide opportunities for shared mobility", and "reroute to use parts of the network that are less busy*'
- Paragraph 4.14.13 details the requirement of mitigation that, '*All stages of the project should support and encourage a modal shift of freight from road to more environmentally sustainable alternatives, such as rail, cargo bike, maritime and inland waterways, as well as making appropriate provision for, and infrastructure needed to, support the use of alternative fuels including charging for electric vehicles*'

- Paragraph 4.14.14 highlights that, '*Regard should be given to the needs of freight at all stages in the construction and operation of the development including the need to provide appropriate facilities for Heavy Goods Vehicle drivers as appropriate*'
- *Paragraph 4.14.15 states that, 'Where considerations are between rail, water-borne or road transport, rail and water-borne options are to be preferred over road transport options, where that option is safe and cost effective'*
- *Paragraph 4.14.16 highlights that, where HGV traffic is substantial, applicants* should *consider a series of mitigation measures such as, 'control numbers of Heavy Goods Vehicle movements to and from the site in a specified period during construction and operation where possible, and consider the impacts of alternative transport routes' and 'provide appropriate infrastructure needed to support vehicles that use alternative fuels (including electric vehicles)*'

18.3.4 Other relevant legislation, policies and guidance considered in the traffic and transport scoping assessment are outlined in Table 18.1.

Table 18.1 Relevant legislation, policy and guidance

Relevant legislation, policy and guidance
Legislation
N/A
National policy
Traffic Management Act (2004)
Designing for Deliveries, Freight Transport Association (2016)
NPS for Water Resources Infrastructure 2023[477]
The National Planning Policy Framework (NPPF) 2023[478]. It is noted that the NPPF (2024) was under consultation until September 2024
Regional policy
Vision Zero for London
The London Plan 2021[479]
LBH Local Implementation Plan 3[480]
Local policy
The LBH Local Plan 2015 - 2030[481] and the LBH Local Plan 2020 - 2041 (emerging policy)
Hounslow Local Plan 2020-2041 Proposed Submission Document[482]

Relevant legislation, policy and guidance
Kingston First Draft of Local Plan (2022)[483]
The LBR Local Plan 2015 - 2018[484] and the LBR 'Pre-Publication' Draft Local Plan (2024)[485]
The RBK Core Strategy 2012[486] and Kingston's Local Plan 2019 - 2041 (emerging policy)[487]
The LBR Supplementary Planning Document, Sustainable Construction Checklist 2013[488]
Standards and guidance
LBR Construction Management Plan Guidance Notes[489]
Planning Inspectorate Rights of way advice note 9: General guidance on public rights of way matters (2022)[490]
Institute of Environmental Management and Assessment (IEMA) Guidelines: Environmental Assessment of Traffic and Movement (2023)[491]
Construction Logistics and Community Safety (CLOCS): Construction Logistics Planning (CLP) Guidance (April 2021)[492]
Design Manual for Roads and Bridges (DMRB) – LA 101 Introduction to environmental assessment (2019)
DMRB – LA 102 Screening projects for Environmental Impact Assessment (2019)
DMRB – LA 103 Scoping projects for environmental assessment (2020)
DMRB – LA 104 Environmental assessment and Monitoring (2020)
DMRB – LA 111 Noise and Vibration, Revision 2 (2020)
DMRB – LA 112 Population and human health (2020)
DMRB – GG 119 Road safety audit (2020)
Transport Analysis Guidance (TAG) Unit M4 – Forecasting and Uncertainty (2023)

18.4 Existing Environment and Baseline Conditions

Study area

18.4.1 The study area has been identified based on which sections of the road network may be used to support the movements of construction vehicles. HGVs are good vehicles with a total gross weight above 3.5 tonnes, including two-axle and multi-axle lorries. These are included among the wider group of heavy-duty vehicles (HDVs), which also include buses and

coaches. Light goods vehicles (LGVs) include cars, trucks, and vans with a gross weight no greater than 3.5 tonnes.

18.4.2 The motorised vehicle access points for the proposed shaft locations are as follows (noting the options for the Thames Lee Tunnel (TLT) connection shaft):

- Drive shaft and interception shaft – Mogden Lane/Rugby Road roundabout
- Intermediate shaft – Ham Street
- Reception shaft, connection shaft and TLT connection shaft at Northweald Lane – Burnell Avenue
- TLT connection shaft at Tudor Drive – Tudor Drive and A307

18.4.3 The intake and outfall structures are also captured within the Burnell Avenue site, meaning that they will share the same access points as the reception shaft and the TLT connection shaft option at Burnell Avenue. The study area at the Burnell Avenue location also includes space within the River Thames adjacent to the right bank to allow for the potential use of river freight.

18.4.4 The study area for transport impacts includes all roads captured within the identified construction routes up to the SRN, which is the national road network managed by National Highways. Given that the SRN carries the majority of the country's freight movements, it is assumed that the existing environmental impact mitigation measures on the SRN implemented by National Highways are sufficient. No further assessment will be required on the condition that no significant increases in HGV concentrations are experienced on the SRN. This method satisfies and/or goes beyond the minimum distance-based requirements for defining the project's impact area identified in DMRB LA 104, LA 105 and LA 111.

18.4.5 The extent of the study area includes the affected road network identified in Figure 18.1, which covers all roads that HGVs need to use to access the SRN (shown in blue) or local goods suppliers. Upon reaching the SRN, construction vehicle movements are assumed to travel to the M25 boundary and further afield on the SRN. The routes contained within the study area capture potential HGV movements which could support the use of wharf facilities on the River Thames. The following local goods suppliers supported by railheads (supporting materials being delivered by rail and HGV for the last-mile) are captured in the routes across the affected road network:

- London Concrete – Transport Avenue, Brentford (north of the River Thames, for the Mogden sewage treatment works (STW) site)
- Day Aggregates – Kingston Road, Tolworth (south of the River Thames, for all other sites)

18.4.6 LGVs for construction deliveries are assumed to use these affected road network routes identified in red. However, routing for LGVs and cars for the workforce during the Project's construction, operation and maintenance has

not been identified on the map. Where any assessment of these movements is required, the scope of impacts would be considered no further than the local authority boundaries which contain the affected road network for HGVs; LBH, LBR, and the RBK. This will satisfy the requirements identified in DMRB LA 104, LA 105 and LA 111.

18.4.7 Covering all routing options, the affected road network north of the River Thames (for Mogden STW) is as follows:

- Local access options to Mogden STW: Rugby Road/B361 Whitton Road, or Mogden Lane/A310 Twickenham Road/A310 London Road
- To SRN: A316 Chertsey Road, and M3 (SRN)
- To London Concrete, Brentford: A310 Twickenham Road (north), B454 Spur Road/B454 Syon Lane, A4 Great West Road, and Transport Avenue

18.4.8 The affected road network south of the River Thames includes:

- Local access options for Ham Playing Fields: Riverside Drive and Dukes Avenue, or Ham Street (S)/Sandy Lane
- Local access for Burnell Avenue: Burnell Avenue, Dysart Avenue, and Beaufort Road
- Local access for Tudor Drive: Tudor Drive and/or A307 Richmond Road (to be confirmed)
- Routing option to M25 via M3: A307 Corridor (north of Dukes Avenue), A316 Chertsey Road
- Routing option to M25 via A3: A307 Corridor (south of Dukes Avenue), A243 Brighton Road, A243 Hook Road, and A3 Kingston Bypass
- To Day Aggregates, Tolworth: A240 Kingston Road

18.4.9 Due to a traffic calming measure on Sandy Lane which presents a vehicle width restriction, there will be a limit on the types of HGVs that will be able to use this route. Whilst the road currently supports access to buses with a width of 2.47m[493], a site visit may be required to confirm the width of HGVs that can be supported.

18.4.10 The affected road network is illustrated in Figure 18.1 using red lines. As well as local roads, this network intersects sections of other road networks including MRNs and London Lorry Control Scheme (LLCS) Permitted Routes in yellow – these form part of the TLRN.

18.4.11 MRNs are typically made up of economically important A-roads that are managed by local authorities. MRNs capture the TLRN, which is the red-route highway network that is directly managed by TfL.

18.4.12 LLCS routes are MRNs allocated for the movement of HGVs that have a maximum gross weight above 18 tonnes, particularly during nights and weekends. Where sections of construction routes fall on roads outside of the LLCS, HGVs are prohibited from using such sections during the restricted

hours (Monday-Friday from 21:00-07:00 including bank holidays, and Saturday 13:00-Monday 07:00)[494], unless registered to the LLCS and permission is obtained from Local Councils. Access routes to be used are subject to confirmation following engagement with relevant stakeholders.

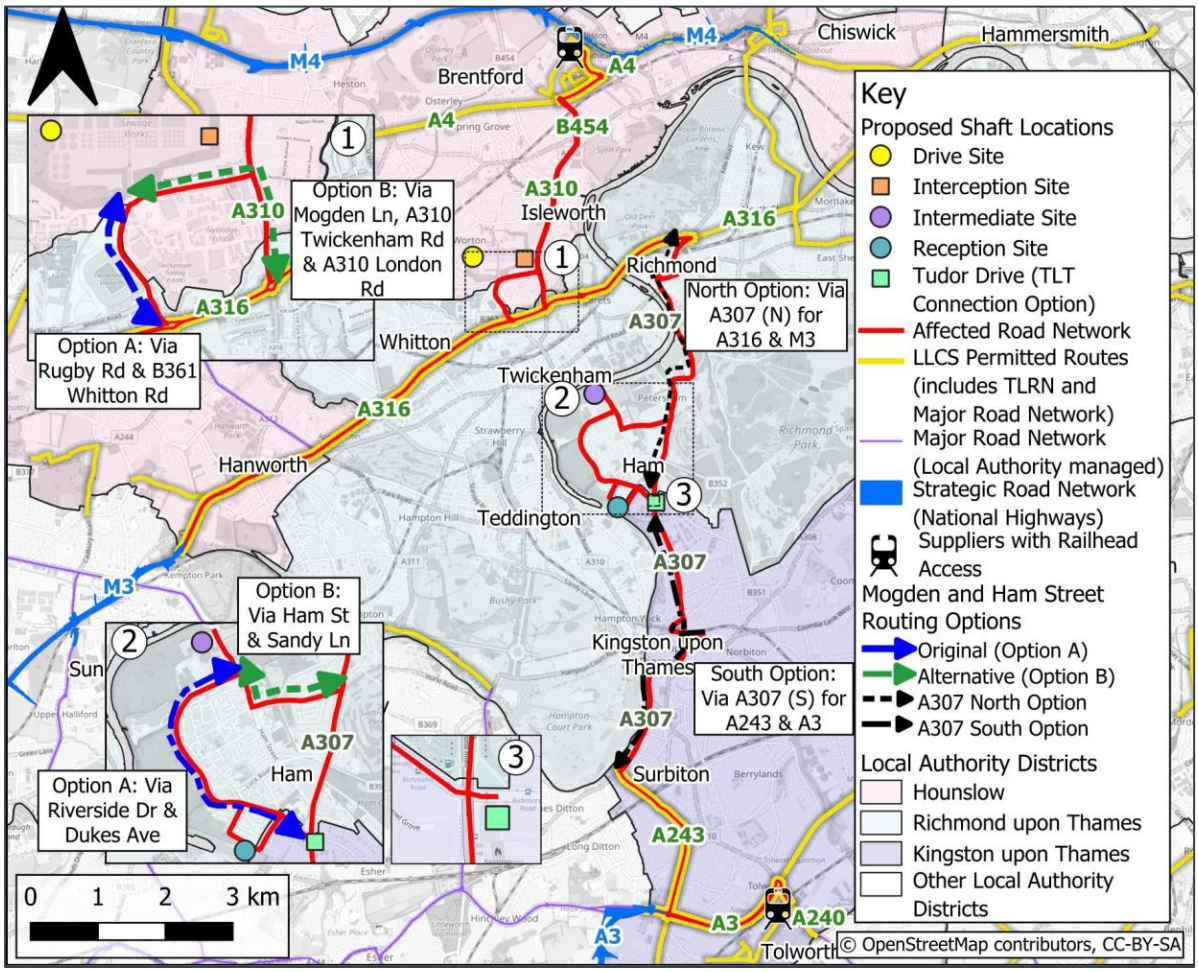


Figure 18.1 Overview of the proposed above ground sites and HGV routes to and from these sites to the SRN (A3 and M3 for the M25)

Baseline Conditions

Road traffic

18.4.13 Each shaft site would have a potential route coming in from the SRN, MRN (TLRN), and accessing the site through residential areas. These routes would be used by HGVs which would typically be delivering materials for the construction of the tunnel, shafts, tertiary treatment plant (TTP) and any associated ancillary infrastructure, cofferdams and shaft and tunnel concrete segments as well as removing excavated waste generated from the construction sites.

18.4.14 For the construction phase, where aggregates are sourced locally (i.e. in Brentford for sites North of the River Thames and Tolworth for site south of the River Thames), access to the SRN may not be required by construction delivery vehicles.

18.4.15 The amenities within the vicinity (500m) of the local affected road network are summarised as follows:

- Day centres:
  - The Woodville Centre – 350m from Riverside Drive
- Education:
  - Ivybridge Primary School – Summerwood Road, off Mogden Lane
  - The Children's Garden Pre School – 350m from Riverside Drive
  - Malden Oaks School and Tuition – Dukes Avenue
  - St Richard's Church of England Primary School – 240m from Riverside Drive
  - Meadlands Primary School – 200m from Dukes Avenue
  - Grey Court School – Sandy Lane
- Healthcare:
  - Lock Road Surgery – 350m from Dukes Avenue
- Leisure, recreation, and retail:
  - Cassel Hospital – 350m from Dukes Avenue
  - Ham Dental Practice – Dukes Avenue
  - Twickenham Stadium (including England Rugby, Virgin Active, and London Twickenham Stadium Hotel) – Rugby Road/B361 Whitton Road
  - Richmond and Kew Football Club – Riverside Drive
  - King George's Field – Ham Street
  - National Trust – Ham House and Garden – Ham Street
  - Sandy Lane Playground – Sandy Lane/Ham Street
  - Riverside Drive Playground – Riverside Drive
  - Tesco – Mogden Lane

18.4.16 Table 6.2 in Chapter 6 Air Quality provides a list of sensitive air quality receptors.

18.4.17 Department for Transport (DfT) have traffic counts at several points along the affected road network. Annual Average Daily Traffic (AADT) flows depict the average number of traffic movements through a particular count point across the given year, subsequently depicting an average day.

18.4.18 2019 data is the most recent pre-COVID19 year, whilst 2022 data is considered the most recent year where data is available after COVID19 restrictions had been fully lifted. 2022 data is primarily considered for this baseline review, whilst 2019 data is available in the few cases where HGV concentrations are visibly greater than in 2022, or at key count point

locations where 2022 data was not published. These selections allow for the most appropriate baseline conditions for HGV traffic to be considered in recent periods.

Existing baseline road traffic conditions

18.4.19 Existing transport conditions have been identified using traffic count data provided by DfT where available. Initially, a mixture of 2019 and 2022 data has been used. Whilst 2022 count point data is favoured, data obtained from 2019 has been used at any count point where HGV concentrations were significantly larger than in the 2022 scenario. This has been carried out due to the continued effect of COVID-19 on traffic concentrations.

North of the river

18.4.20 Recent DfT count point data is limited to the MRN and SRN sections of the affected road network north of the River Thames. Table 18.2 summarises the traffic volumes and concentrations along the available sections of the A310 and A316 corridors.

18.4.21 The London Highway Assignment Model (LoHAM) is TfL's strategic model of London's road network and its surrounding area. It represents motorised highway trips on the network by incorporating routing choices and congestion[495]. Further traffic flow data is available from the LoHAM for the other key sections of the affected road network north of the river if required. Automated traffic counts can be obtained where there is missing coverage in the traffic model to understand the existing traffic conditions across the affected road network.

18.4.22 In 2022, the A310 corridor had average daily traffic volumes between 21,300 to 21,600 vehicles. Concentrations of vehicles are relatively consistent at the three identified traffic count locations, with HGVs making up 3% of total vehicle movements and cars making up approximately three in four vehicle movements along the corridor.

18.4.23 The A316 corridor, a LLCS Permitted Route, has the largest volumes of vehicles, exceeding 56,700 daily movements at the traffic count location. HGVs make up 3% of the total concentration of vehicles at this traffic count location. Almost four in five vehicles identified are cars and taxis, whilst it has the highest concentration of LGVs (16%) compared to the other identified count points north of the river.

Table 18.2 Total vehicle movements at key count points available on the affected road network north of the River Thames

Count point location	Year	Total vehicles	Cycles	Motor cycles	Cars and taxis	Buses and coaches	LGVs	HGVs
A316 Chertsey Road, between B361 Whitton Road and B358 Hospital Bridge Road	2022	56,711	1%	2%	78%	0%	16%	3%
A310 Twickenham Road, between Dawes Avenue and Bankside Close	2022	21,548	3%	3%	75%	3%	14%	3%
A310 Twickenham Road, between North Street and Mill Plat Avenue	2022	21,302	3%	3%	73%	3%	15%	3%

South of the river

18.4.24 The A307 corridor south of the River Thames had the greatest traffic volumes, exceeding 27,000 average daily vehicle movements on several sections and reaching as high as 35,035 on A307 Clarence Street. Traffic volumes also exceeded 21,000 average daily movements at the count point on A310 London Road.

18.4.25 Dukes Avenue has a greater percentage of cycle movements compared to other affected roads, with more than one in six vehicles being cycles.

18.4.26 Bus and coach movements are 10% or greater at three key points along the A307 corridor. This can be explained by the presence of Kingston Bus Terminal and the large volumes of bus routes that intersect Kingston Town Centre.

18.4.27 AADTs from DfT counts are summarised in Table 18.3 These include relevant count points along the affected road network up to the LLCS Permitted Routes. Additionally, data has been provided for the A243 corridor, which is the first LLCS Permitted Route south of the river which HGVs could use to access the SRN. Percentage values are rounded to the nearest whole percentage.

Table 18.3 Total vehicle movements at key count points available on the affected road network south of the River Thames

Count point location	Year	Total vehicles	Cycles	Motor cycles	Cars and taxis	Buses and coaches	LGVs	HGVs
A307 Hill Street, between Red Lion Street and Bridge Street	2019	14,932	7%	4%	67%	10%	11%	1%
A307 Upper Ham Road, between B352 Ham Gate Avenue and Church Road	2019	15,565	3%	2%	75%	2%	17%	1%
A307 The Quadrant, between A307 George Street and A307 Kew Road	2019	8,993	6%	6%	58%	15%	12%	4%
A307 Fairfield North, between A307 Wheatfield Way and A308 London Road	2019	27,434	1%	3%	77%	5%	13%	1%
A307 Richmond Road, between Richmond Park Road and Kings Road	2022	19,934	3%	3%	77%	2%	14%	2%
A307 Red Lion Street, between A307 Paradise Road and A307 George Street	2019	11,239	4%	4%	67%	10%	12%	3%
Dukes Avenue, between Riverside Drive and Hardwicke Road	2019	2,906	18%	1%	74%	1%	7%	1%

Count point location	Year	Total vehicles	Cycles	Motor cycles	Cars and taxis	Buses and coaches	LGVs	HGVs
Sandy Lane, between Ham Street and A307 Portsmouth Road	2019	4,110	2%	2%	79%	4%	10%	2%
A307 Clarence Street, between A307 Wood Street and north of A307 Fairfield North	2019	35,035	1%	2%	79%	5%	13%	1%
A308 Sopwith Way, between A308 Wood Street and Kingsgate Road A307	2019	33,138	1%	3%	82%	2%	11%	1%
A307 Portsmouth Road, between Uxbridge Road and Catherine Road	2022	14,140	6%	2%	79%	1%	10%	1%
A243 Upper Brighton Road, between A243 Brighton Road and A3210 Kingsdown Road	2022	16,791	3%	2%	78%	3%	12%	1%

Future baseline road traffic conditions

18.4.28 Estimated future traffic flow data is available from the LoHAM. To reflect traffic conditions during the peak year of construction activity, traffic flows on the affected road network will be extracted from the LoHAM model for the relevant forecast year of assessment. For any sections of the affected road network that are not covered by the model, traffic flows from automatic traffic counters (ATCs) will be used with traffic growth rates embedded in the LoHAM model applied to align with the future baseline year.

Data collection: Road Traffic

18.4.29 Average annual traffic flows are the average total number of vehicle movements for a day in a given year. These are provided in an AADT format over a 24-hour period, which is required for air quality assessments in this ES (Chapter 6 Air Quality). Moreover, these are provided in an Annual Average Weekday Traffic (AAWT) format over an 18-hour period for traffic noise assessments in this ES (Chapter 7 Noise and Vibration). This data will be obtained for the affected road network and shared with air quality and noise assessment specialists to reflect traffic conditions in the future baseline year comparison scenarios.

18.4.30 The impacts will be explored at the locations identified in Table 18.4 and Table 18.5, consideration will also be given in further assessments to the use of river freight. Given the affected road network up to and including the linked LLCS Permitted Routes fall within district-wide AQMAs, it is noted that the threshold of 25 additional HGVs is exceeded north of the River Thames in all potential scenarios and route distribution options.

Table 18.4 Traffic impacts on local affected road network by routing option – North of the River Thames

Sites	North of the River Thames: Mogden STW			
Routing option and affected road network	A316 50/50 split	A316 via Rugby Rd/B361	A316 via Mogden Ln/A310	Transport Avenue (for railhead access)
Rugby Road/B361 Whitton Road (N1)	✓	✓		
Mogden Lane/A310 Twickenham Road/A310 London Road (N2)	✓		✓	
A316 Chertsey Road	✓	✓	✓	
A310 Twickenham Road (north)				✓
B454 Spur Road/B454 Syon Lane				✓
A4 Great West Road				✓
Transport Avenue				✓

Table 18.5 Traffic impacts on local affected road network by routing option – South of the River Thames

Sites	South of the River Ham Playing Fields and Burnell Avenue				
Routing option and affected road network	A316 via Riverside Drive/Dukes Avenue	A316 via Ham Street/Sandy Lane	A243 via Riverside Drive/Dukes Avenue	A243 via Ham Street/Sandy Lane	A240 Kingston Road (for railhead access)
Riverside Drive and Dukes Avenue (West)	✓		✓		
Burnell Avenue /Dysart Avenue /Beaufort Road	✓	✓	✓	✓	
Dukes Avenue (East)	✓	✓	✓	✓	
Ham Street (S) /Sandy Lane		✓		✓	
A307 Corridor, excluding A307 Upper Ham Road	✓	✓	✓	✓	
A307 Upper Ham Road	✓	✓		✓	
A243 Brighton Road			✓	✓	
A243 Hook Road					✓
A3 Kingston Bypass					✓
A240 Kingston Road					✓

18.4.31 Traffic data will be in an 18-hour annual average weekday traffic (AAWT) format for the assessment of noise impacts. The latest DfT traffic count dataset, which is currently 2023, will be used to represent the baseline traffic conditions given that post-COVID 19 travel behaviour has stabilised.

18.4.32 Where the latest DfT traffic count data does not cover certain locations, manual classified counts and automatic traffic counts will be undertaken to provide full coverage. Based on the network covered in the LoHAM 2023 traffic model, it is expected that surveys would be required at the following locations as a minimum:

Automatic traffic counters

- One on Transport Avenue, Brentford
- One on Dysart Avenue (south)
- One on Burnell Avenue
- One on Beauford Road (south)

Classified turning counts

- Ham Street/Riverside Drive junction, Ham Street/Sandy Lane junction, and Sandy Lane/A307 junction
- Dukes Avenue/Beaufort Road junction, Dukes Avenue/Dysart Avenue junction, and Dukes Avenue/A307 junction

18.4.33 Automatic traffic counts would be carried out over a neutral two-week period whilst classified turning counts be taken during the three traffic peaks (AM, IP, and PM) on a standard weekday. Both survey types will take place during school term-time and outside of bank holidays or weekends.

Active modes

Existing baseline conditions for active modes

18.4.34 In the IEMA Environmental Assessment of Traffic and Movement[496], Rule 1 (Geographic extent – spatial scope) and Paragraph 2.19 highlights that environmental assessments for environmental and population impacts are expected to include highway links where traffic flows will increase by more than 30%, or the number of HGVs would increase by more than 30%. These impacts include severance, pedestrian delay, and fear and intimidation.

18.4.35 Additionally, Rule 2 (Geographic extent – spatial scope) and Paragraph 2.21 highlights that environmental and population impacts for sensitive groups and locations should be examined if flows increase by 10% or more along a highway link, along with any links that would experience large increases in HGVs. These criteria are suitable for defining the scope of assessment required for severance, pedestrian delay, and fear and intimidation in this EIA. The maximum changes in traffic volumes will be considered in identifying this scope.

18.4.36 The following cycle routes intersect the affected road network between access points of the construction site and the LLCS Permitted routes:

- TfL routes: C40 (A310 Twickenham Road), C28 (along A307 Corridor, from A307 High Street/A307 Portsmouth Road to A243 Brighton Road), C29 (A308 Sopwith Way/A307 Wood Street/A307 Clarence Street A307 Wheatfield Way), and C30 (A307 Queen Elizabeth Road)
- Kingston Cycle Campaign Routes: Thames Riverside and Richmond Park (A307 Upper Ham Road/A307 Richmond Road, and A307 Wood Street), Blue (A307 Richmond Road/A307 Wood Street, and A307 Queen Elizabeth Road/A307 Clarence Street/A307 Wheatfield Way), Red: Berrylands – Richmond Park (A307 Richmond Road/A307 Queen Elizabeth Road), Purple: University – Ham (A307 Wood Street/A307 Wheatfield Way), Green: Surbiton – Teddington Lock (A307 Wood Street/A307 Kingston Hall Road), and - Pink: Portsmouth Road – Kingston Bridge (A307 High Street)

18.4.37 Segregation and priority measures for cyclists are implemented along these corridors, protecting cyclists from other motorists including the vehicle traffic generated by the development's construction, operation, and maintenance. Nonetheless, these matters are proposed to be scoped in until clarity is provided on which parts of the affected road network will exceed the traffic volume increase thresholds discussed above.

18.4.38 Public Rights of Way (PRoW) are footpaths, bridleways, and byways where the public have a right to pass at all times. There are no PRoWs that link or intersect the affected road network for the sites north of the River Thames. Figure 18.2 identifies and labels the PRoW that are linked to or intersect local roads within the affected road network south of the River Thames up to the A307 corridor. These minor roads have been scoped in as it is expected that some of them will experience increases in HGV traffic volumes above 30%, thus exceeding the threshold to examine environmental impacts as identified in Rule 1 (Geographic extent – spatial scope) of the IEMA Environmental Assessment of Traffic and Movement guidance. Whether such assessments will be required on the MRN will depend on the concentrations identified in the LoHAM for the forecast year.

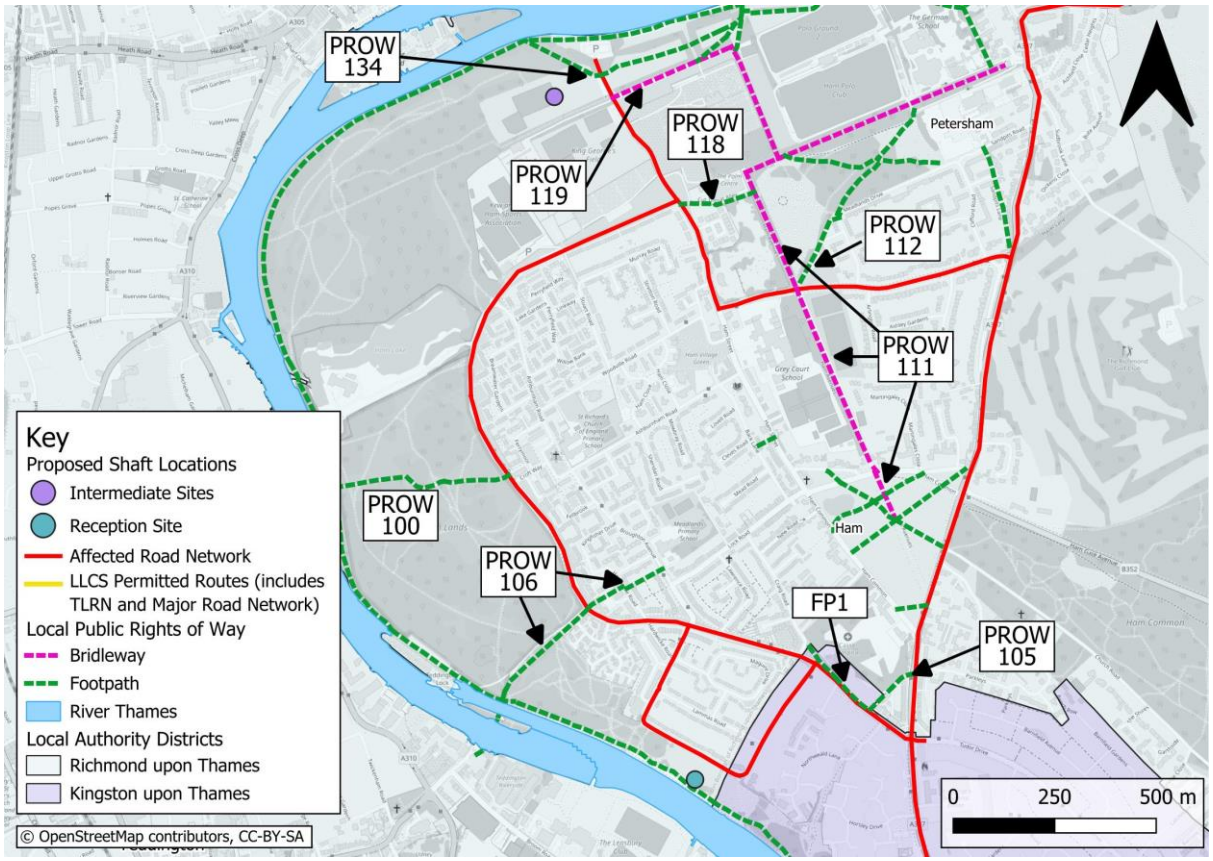


Figure 18.2 PRoW Routes linking to the local affected road network south of the River Thames

Data collection: Non-motorised users

18.4.39 The latest IEMA Environmental Assessment of Traffic and Movement guidance highlights that the following information should be collected:

- The location, the type of route, and its geographical extent
- The frequency of use within the study area

18.4.40 A desktop study of PRoW maps provided by the local authorities will be used to review the location, type, and geographical extent of each PRoW.

18.4.41 Manual Classified Counts will be conducted to obtain this data. This is relevant for sites south of the River Thames up to the A307 corridor. In addition to the PRoW listed in Table 18.9, it is expected that affected PRoW will be considered along any additional parts of the affected road network such as those identified in Figure 18.2. If severance, pedestrian delay and/or intimidation thresholds for assessment are exceeded and are worsened compared to their status in the baseline.

18.4.42 Table 18.6 below summarises the locations of Walking, Cycling and Horse Riding (WCHR) route surveys to be considered. It should be noted that the table below identifies local WCHR routes across different project design options and construction traffic routing options. If any options are scoped out at the time of the EIA, the surveys for the associated WCHR along these routes will not be required.

Table 18.6 Survey locations for pedestrians, cyclists, and horse-riders

Name	Survey locations	Sensitive to scheme design/routing
PROW 100	1x from Riverside Drive	Yes
PROW 118	1x from Ham Street	Yes
PROW 119	1x from Ham Street	Yes
PROW 134	1x from Ham Street Car Park	Yes
PROW 111	2x from Sandy Lane – 1 on north side, 1 on south side	Yes
PROW 112	1x on Sandy Lane	Yes
National Trail	On-route, by Burnell Avenue reception shaft location	Yes

Public transport

Buses

18.4.43 For Mogden STW, which is located north of the river, eight bus routes were identified on the affected road network as shown in Table 18.7. Five of these bus routes operate at a frequency of four services per hour or more.

18.4.44 For sites south of the river up to the LLCS Permitted Routes via the north of the Thames, a total of 14 routes as shown in Table 18.7 were identified on the affected road network, 12 of which operate with a frequency of at least four buses per hour.

18.4.45 For sites south of the river up to the LLCS Permitted Routes for the SRN travelling southbound, 28 bus routes as shown in Table 18.7 are identified on the affected road network. 14 of these services operate at a frequency of four or more buses per hour. This can be primarily attributed to buses from the bus station on A307 Cromwell Road. It should be noted that the buses leaving the station are granted assigned priority by signals to re-enter the carriageway, of which all construction traffic must comply to.

Table 18.7 Bus services on construction routes north and south of the River Thames

Bus service	Route	Typical frequency (minimum)	North	South routing options	
				South to North	South to South
110 (TfL)	School Road – Hammersmith Bus Station	four per hour	✓	✓	
117 (TfL)	West London Mental Health Trust –Staines Bus Station	three per hour	✓		
267 (TfL)	Hammersmith Bus Station – South Road/Fulwell	four per hour	✓		
481 (TfL)	Kingston Station – West London Mental Health Trust	two per hour	✓		✓
H20 (TfL)	Twickenham Tesco – Civic Street	five per hour	✓		
H22 (TfL)	The Bell – West Middlesex Hospital	four per hour	✓		
H28 (TfL)	Tesco Osterley – Bulls Bridge Tesco	three per hour	✓		
H37 (TfL)	Hounslow/Blenheim Centre – Manor Road	seven per hour	✓	✓	
33/N33 (TfL)	Montrose Avenue – Cromwell Road Bus Station	six per hour		✓	
65/N65 (TfL)	Brook Street – Ealing Broadway Station	six per hour		✓	✓
190 (TfL)	George Street – Empress State Building/West Brompton Station	four per hour		✓	
337 (TfL)	Northcote Road – Richmond Bus Station	four per hour		✓	
371 (TfL)	Manor Road/Sainsbury's – Kingston Hall Road	five per hour		✓	✓

Bus service	Route	Typical frequency (minimum)	North	South routing options	
				South to North	South to South
419 (TfL)	George Street – Norley Vale	four per hour		✓	
490 (TfL)	Pools on the Park – Heathrow Terminal 5	five per hour		✓	
969 (TfL)	Gladstone Avenue Whitton – Roehampton Vale/Asda	one per day, Tuesdays, and Fridays		✓	
K5 (TfL)	Dysart Avenue – Morden Station	two per hour		✓	✓
R68 (TfL)	Kew Retail Park – Hampton Court Station	four per hour		✓	
R70 (TfL)	Nurserylands Shopping Centre – Richmond/Manor Road	six per hour		✓	
65 (TfL)	Brook Street – Ealing Broadway Station	six per hour		✓	✓
57 (TfL)	Fairfield Bus Station – Atkins Road/New Park Road	four per hour			✓
71 (TfL)	Chessington World of Adventures – Cromwell Road Bus Station	five per hour			✓
85 (TfL)	Putney Bridge Station – Kingston Hall Road	six per hour			✓
111 (TfL)	Heathrow Central Bus Station – Cromwell Road Bus Station	11 per hour			✓
131 (TfL)	Fairfield Bus Station – Tooting Broadway Station	six per hour			✓
213 (TfL)	Fairfield Bus Station – Sutton Bus Garage	four per hour			✓

Bus service	Route	Typical frequency (minimum)	North	South routing options	
				South to North	South to South
281 (TfL)	Hounslow Bus Station – Tolworth Tower	four per hour			✓
285 (TfL)	Heathrow Central Bus Station – Cromwell Road Bus Station	five per hour			✓
406 (TfL)	Cromwell Road Bus Station – Epsom Hospital	three per hour			✓
411 (TfL)	Cromwell Road Bus Station – Central Square	three per hour			✓
418 (TfL)	Cromwell Road Bus Station – Epsom Station	three per hour			✓
465 (TfL)	Cromwell Road Bus Station – South Street/Rose Hill	two per hour			✓
671 (TfL)	Tiffin Girls School – Chessington South Station	School service (one daily)			✓
K1 (TfL)	New Malden Station – Cromwell Road Bus Station	five per hour			✓
K2 (TfL)	Kingston Hospital – Hook Parade	five per hour			✓
K3 (TfL)	Roehampton Vale/Asda – Esher High Street or Trinity School	four per hour			✓
K4 (TfL)	Kingston Hospital – Ripon Gardens	two per hour			✓
X26 (TfL)	West Croydon Bus Station – Heathrow Central Bus Station	two per hour			✓

Bus service	Route	Typical frequency (minimum)	North	South routing options	
				South to North	South to South
458 (Diamond bus south east)	Kingston – Staines	one per hour			✓
461 (Falcon buses)	Kingston upon Thames – St. Peter's Hospital	two per hour			✓
514/515 (Falcon buses)	Kingston upon Thames – Brooklands Centre	one per hour			✓
715 (Stagecoach South)	Kingston – Guildford	one per hour			✓
513 (Reptons)	Downside – Kingston	two services per day (AM)			✓

Source: Transport for London,[497] Diamond Buses,[498] Stagecoach,[499] and Traveline[500] (correct as of 17 July 2023, except for routes 117, 481, H20 and H28 – this data was obtained on 13 August 2024)

Rail

18.4.46 Syon Lane Railway Station is located along Syon Lane, which forms part of the affected road network for HGV movements between Mogden STW and London Concrete in Brentford. Access to the station for pedestrians is supported by a signalised pelican crossing, which grants pedestrians right-of-way across the highway to navigate between the bus stops on either side of the carriageway and the entrance to the train station.

18.4.47 Hounslow East London Underground Station can be considered for supporting workforce trips to Mogden STW. The station provides services to London Heathrow Airport's terminals 2, 3 and 5 to the west, and services as far as Cockfosters to the northeast. From the station's access point on Kingsley Road, access to the Mogden STW's north access on Oak Lane can be obtained via A315 London Road and Bridge Road. For example, there is a 7-minute journey time for cyclists and a 9-minute journey time for car drivers during the AM peak. A315 London Road and Bridge Road are used to access Mogden STW's south access, along with Worton Road, Hall Road and Whitton Dene. The station is a 9-minute cycle journey and a 14-minute

car journey from the south site access from Mogden Lane/Rugby Road during the AM peak.

18.4.48 Hounslow Central Underground Station also supports the same underground services as Hounslow East; however, it has not been considered further as it has longer travel times to the site. Any workforce trips to the site would therefore most likely alight at Hounslow East Underground Station.

18.4.49 Hounslow Railway Station provides services from Weybridge to the southwest and London Waterloo to the east. For the AM peak, travel distances and times are very similar for car journeys and cycle journeys, taking around seven minutes to access both the north and south accesses to Mogden STW, with journey lengths of 1.9-2.1km to the site access points. Construction delivery vehicles are not expected to be routed past the station access point on B361 Whitton Road, however shuttle services may be considered as part of the plan to transport the construction workforce to the site. These would be routed along Heath Road and Worton Road for northern access to the Mogden STW site, or via Whitton Dene for southern access to the site.

18.4.50 Syon Lane Railway Station also supports the same railway services as Hounslow Railway Station; however, it has not been considered further as it has longer travel times to the site. Any workforce trips to the site would therefore most likely alight at Hounslow Railway Station.

18.4.51 Twickenham Railway Station provides services as far as Reading to the west and London Waterloo to the East. Passenger access is provided from A310 London Road, which thereafter connects to B361 Whitton Road and thereafter Rugby Road for vehicular access to Mogden STW's south access. For example, to arrive in the AM peak, it is a 7-minute journey for cyclists and a 12-minute journey for car drivers.

18.4.52 St Margarets Railway Margarets Railway Station also supports the same railway services as Twickenham Railway Station; however, it has not been considered further as it has longer travel times to the site. Any workforce trips to the site would therefore most likely alight at Twickenham Railway Station.

18.4.53 Richmond Railway Station and Richmond Underground Station provide services as far as Upminster to the east and Reading to the west. For example, the station is a 12-minute cycle journey and a 14-minute car journey during the AM peak from the main south access to Mogden STW north of the River Thames and is a 17-minute cycle journey and a 24-minute car journey from Burnell Avenue's site access south of the River Thames. The station can be accessed by passengers via A307 Kent Road (step-free) or via Church Road

18.4.54 Kingston Railway Station provides rail services to central London and Shepperton to the west of London. The station is a 9-minute cycle journey and a 14-minute car journey from the site access to Burnell Avenue during the AM peak. Passengers can access the station via A307 Wood Street or A307 Cromwell Road. Similarly, to Richmond rail stations, motorists must provide pedestrians right of way at the pelican crossing when signalled to do so.

Table 18.8 Railway Station Frequencies (May 2023)

Origin	Destination	Peak average (inbound and outbound)		
		06:00-19:00 average	AM Peak: 07:00-09:00 average	PM Peak: 18:00-19:00
Syon Lane	London Waterloo	3	4	4
	Weybridge	3	3	4
Hounslow Railway Station	London Waterloo	3	4	4
	Weybridge	3	3	4
Hounslow East London Underground Station	Cockfosters	9	6	12
	Heathrow Terminal 5	6	6	6
	Kings Cross St Pancras	12	12	12
Richmond Railway Station	Stratford	4	5	5
	Waterloo	7	9	9
	Windsor and Eton Riverside	2	2	2
	Reading	2	2	2
	Upminster (Underground)	5	4	5
Richmond Underground Station	Victoria Underground	6	7	7
	Upminster	5	4	5
Twickenham Railway Station	Reading	2	2	2
	Waterloo	7	9	10
	Wimbledon	2	2	2

Origin	Destination	Peak average (inbound and outbound)		
		06:00-19:00 average	AM Peak: 07:00-09:00 average	PM Peak: 18:00-19:00
	Windsor and Eton Riverside	2	2	2
Kingston Railway Station	London Waterloo	4	4	4
	Shepperton	2	2	2

Source: Network Rail[501], Transport for London[502]

River transport

18.4.55 The boundary of the Burnell Avenue Site intersects the River Thames from the south bank to allow the construction of the outfall and intake structures. During the Project's operation, these structures will be connected directly to the River Thames. It is therefore necessary to consider the existing use of the river in the vicinity of the site.

18.4.56 In order to uncover nearby vessel activity at a range of times during a standard weekday that construction activity would occur, observations of vessel activity were made during a term-time working week. For the working week of 3 June 2024 to 7 June 2024, tracking of vessel activity records were obtained for 09:00, 12:00, 15:00 and 18:00. The following vessels were identified along the River Thames and located in the vicinity of the proposed location of the outfall structure upstream of Teddington Weir[503]:

- TANNER (MSSI: 232038663)
- NEW SOUTHERN BELLE (MSSI: 235090271)
- SANFIONA (MSSI: 235072057)
- GOLDEN SALAMANDER (MSSI: 235055107)
- RICHMOND ROYALE (MSSI: 235102529)

18.4.57 Moreover, surveys of the use of the River Thames in the Project's vicinity are outlined in Chapter 16 Socioeconomic, Community, Access and Recreation of this EIA Scoping Report.

18.5 Sensitive Receptors and Potential Environmental Effects

Sensitive receptors

18.5.1 The assessment of potential traffic and movement related impacts on sensitive receptors will adhere to good practice set out in paragraph 1.28 of the IEMA[504] guidance. These guidelines serve as a foundation for

establishing appropriate thresholds of change and emphasise the importance of considering specific groups or locations that are particularly vulnerable to changes in traffic conditions.

18.5.2 The following user groups will be considered as receptors:

- Non-Motorised Users (NMUs)
- PRoW users
- Motorists and freight vehicles
- Public transport users, and
- Emergency services

18.5.3 Those people who are likely to be particularly sensitive and/or vulnerable to change would likely include those who are:

- Pregnant mothers (and their unborn children)
- Of a young age (for example school age or younger)
- Of an older age (for example those aged 65 and above)
- On a lower income
- With poor health or impaired mobility
- With a social disadvantage, and
- With access or geographical factors (i.e. people living in remote or rural areas)

18.5.4 The following list identifies special interests that will be considered when defining sensitive receptors at geographical locations. The sensitive locations will inform the assessment of effect significance when the Project traffic is assigned to the network:

- People at home
- People at work
- Sensitive and/or vulnerable groups (see paragraph 18.5.3)
- Locations with concentrations of sensitive and/or vulnerable users (e.g. hospitals, places of worship, schools)
- Retail areas
- Recreational areas
- Tourist attractions
- Collision clusters and routes with road safety concerns, and
- Junctions and highway links already at (or over) capacity

18.5.5 Aspects influencing sensitivity include the receptor's level of protection, adaptability to change, the duration of the expected change and professional judgement.

18.5.6 The WCHR routes within the affected road network's local minor roads have been listed in Table 18.9. Severance concerns significant changes to journey times or lengths caused by road traffic. Pedestrian delay concerns the changes in waiting time for pedestrians, which includes crossing facilities. Intimidation is relevant in the context of construction vehicle impacts in terms of the closeness of vehicles passing non-motorised users. Whilst the anticipated relevant impacts have been identified, each impact will still be considered in the scope for each relevant WCHR route in the EIA.

Table 18.9 Local sensitive receptors – walking, cycling and horse-riding routes

Name	Assessment of potential effects
PROW 105	Segregated from highway, no severance anticipated.
FP1	Segregated from highway, no severance anticipated.
PROW 100	Recreational path accessed directly from Richmond Avenue. Potential for impacts depends on which freight routing option is selected.
PROW 106	Right-of-way for non-motorised users at parallel crossing is maintained.
PROW 118	No segregated pathway upon entry/exit of Ham Street.
PROW 119	No severance anticipated. To be confirmed in EIA.
PROW 134	If Ham Street Car Park shaft option is used, temporary severance of PRoW is expected during construction
PROW 111	Crossing point joining the bridleway on each side of Sandy Lane.
PROW 112	Pedestrians accessing from the south may rely on use of the designated crossing point across Sandy Lane (also for PROW 111).
National Trail	Depending on the alignment of the on-site construction haul route(s), existing access for non-motorised users could be severed.

18.5.7 Table 18.10 identifies the list of sensitive receptors that are potentially affected by the construction traffic generated by the above ground sites.

Table 18.10 Local sensitive receptors – key trip attractors

Name	Location	Amenity type
Allianz Stadium, Twickenham (including England Rugby, Virgin Active, and London Twickenham Stadium Hotel).	Rugby Road/B361 Whitton Road	Leisure
Tesco	Mogden Lane	Retail
Ivybridge Primary School	Summerwood Road, off Mogden Lane	Education
Lock Road Surgery	350m from Dukes Avenue	Healthcare
The Children's Garden Pre School	350m from Riverside Drive	Education
Richmond and Kew Football Club	Riverside Drive	Leisure
Malden Oaks School and Tuition	Dukes Avenue	Education
Cassel Hospital	350m from Dukes Avenue	Healthcare
King George's Field	Ham Street	Leisure
St Richard's Church of England Primary School	240m from Riverside Drive	Education
Meadlands Primary School	200m from Dukes Avenue	Education
Grey Court School	Sandy Lane	Education
Sandy Lane Playground	Sandy Lane/Ham Street	Recreation
National Trust – Ham House and Garden	Ham Street	Leisure
Ham Dental Practice	Dukes Avenue	Healthcare
Riverside Drive Playground	Riverside Drive	Recreation
The Woodville Centre	350m from Riverside Drive	Day Centre

Potential environmental effects

18.5.8 Effects on traffic and movement are likely to be experienced during both the construction and operational phases of the Project. As described in paragraph 3.3 of the IEMA Environmental Assessment of Traffic and Movement guidance, the seven traffic and movement matters below will be assessed:

- Driver delay
- Pedestrian delay (as a proxy for all NMU delay)
- NMU amenity
- Fear and intimidation
- Road user and pedestrian safety
- Hazardous/large loads

18.5.9 The sections below outline the likely significant effects associated with the construction and operation of the Project associated with each matter outlined above.

Construction

18.5.10 Potential effects during the construction of the Project include:

- Severance – there are likely to be alterations to footways, cycleways, equestrian routes, and PRoWs, including temporary diversions or permanently diverted routes reinstated elsewhere to remain consistent with the existing PRoWs. These changes may occur at the sites south of the River Thames, depending on the final site selections and boundary arrangements. PRoW 133 (Thames Towpath) in LBR runs parallel to Burnell Avenue and will potentially be severed by the Burnell Avenue site boundaries. Moreover, PRoWs 133 and 134 in LBR could be severed if Ham Street Car Park is used as an intermediate shaft site. These changes may temporarily affect WCHR due to potential effects on PRoW and local roads. Effects are expected to be negligible along the A307 and A310 corridors which feed into the LLCS Permitted Routes due to the presence of segregated cycle lanes and controlled crossing infrastructure which favours non-motorised users, which will not be altered by construction works.
- Driver delay – there may be temporary adverse effects associated with construction activities, including the movement of materials, equipment, and personnel, as well as the presence of HGVs which are expected to increase traffic volumes and alter traffic flows on nearby roads. Partial or full road closures are not expected as a result of the construction works.
- Pedestrian delay – there are likely to be temporary adverse effects on pedestrian journey times, particularly if paths are closed or diverted, or associated with increased construction HGVs and construction worker vehicle movements. These may occur with the Sandy Lane construction

routing option, whereby PRoW 111 is intersected by Sandy Lane and is supported by an uncontrolled crossing point, which also links to PRoW 112. B454 Syon Lane, which would be used by the Project's construction HGVs to access Day Aggregates on Transport Avenue, is not expected to experience pedestrian delays given there is a controlled pelican crossing to support access to Syon Lane Railway Station, which is its main trip attractor. Moreover, Kingston Railway Station and Richmond Railway Station, which are both located along the A307 corridor, are supported by controlled crossings for pedestrians to have priority over motorised traffic when signalled to.

- NMU amenity – there is potential for temporary adverse effects during construction if alterations are required to footways, cycleways, equestrian routes and PRoW, which would reduce the attractiveness and accessibility of the area for cyclists, walkers/wheelers and horse riders with noise, dust and visual intrusion diminishing user experience.
- Fear and intimidation – there is potential for temporary adverse effects on NMUs, along with perceived increased risk due to the increase in construction traffic, HGVs and the presence of construction workers, particularly in relation to vulnerable groups.
- Road safety – there could be temporary adverse effects on road safety, with changes in traffic volumes. Additionally, increased construction traffic could increase the risk of accidents and road condition deterioration.
- Hazardous/large loads – there could be temporary adverse effects as a result of abnormal loads during construction, namely the transportation of the TBM. This may require the use of escort vehicles with the potential for temporary delays.

18.5.11 The boundary of the Burnell Avenue Site is expected to intersect the River Thames from the bank to allow the construction of the intake and outfall structures. This would temporarily reduce the usable width of this section of the river for river vessels. The potential for any significant impacts will need to be clarified once the site boundaries have been confirmed.

Operation and maintenance – land effects

18.5.12 There are likely to be HGV, LGV and car movements associated with the operation and maintenance of the TTP and shafts north of the river. For operating the TTP at Mogden STW, the delivery of chemicals will be required. This is estimated to be one delivery per week by an HGV tanker.

18.5.13 The vehicle movements for operation and maintenance are expected to be limited south of the river. The conveyance route shafts will require minimal maintenance and tunnel will be inspected approximately every 5-10 years. Inspection would require access to the shafts (Mogden STW shafts, Ham Playing Fields, Burnell Avenue, and Tudor Drive). On-site maintenance at the

Burnell Avenue site is expected to comprise of a brief weekly visit by Thames water staff typically using a small van (LGV). An annual inspection at this location will also be undertaken typically lasting a couple of days involving two or three Thames Water staff utilising small vans.

18.5.14 A detailed assessment of the environmental impacts relating to traffic from operational and maintenance activities will not be required on the basis that the associated impacts will be negligible:

- Severance – impacts are expected to be negligible as it is expected that any closed or diverted PRoW during construction works will be returned as closely as possible to their original alignments ahead of the Project's operation
- Driver delay, pedestrian delay, NMU amenity, fear and intimidation, and road safety – these impacts are expected to be negligible on a daily level, given the small volume of vehicles required for operational and maintenance activities, as outlined in paragraphs 18.5.12 and 18.5.13
- Hazardous/large loads – there are unlikely to be any abnormal loads during the operational phase

Operation and maintenance – river effects

18.5.15 During the Project's operation, there would be limited changes in water levels and flows in the Tidal River Thames (Tideway). It should be noted that there are no perceived changes to levels in the freshwater River Thames in the reach upstream of the Teddington Weir caused by the operation of the Project. Small changes to water levels in the Tideway are expected during the schemes operation, associated with a reduction in output from the existing Mogden STW discharge, which is typically expected to be once every two years for a few months. Changes in water levels and potential effects on the movement of vessels are proposed to be scoped in for assessment as part of the EIA.

18.6 Assessment Methodology

18.6.1 The assessment methodology for Traffic and Transport will be informed by the IEMA Guidelines: Environmental Assessment of Traffic and Movement (2023)[505]. The Traffic and Transport chapter of the EIA will consider the impact of the construction traffic movements on cyclists, but no detailed assessment of operational transport impacts on cyclists is expected as part of the EIA, given there are not expected to be regular HGV movements and minimal LGV movements to the development's sites for its operation and maintenance.

Assessment Scope

Multimodal

18.6.2 TfL's guidance for Construction Logistic Plans (CLP) recommends investigating rail and river freight modes. To this effect, an initial review of multi-modal options for transportation was conducted. It was determined that direct rail freight is scoped out of the EIA due to the absence of suitable railway lines within the site's local vicinity. Nonetheless, the use of railheads for the import of construction materials is scoped in for consideration to source materials for last-mile deliveries via HGVs.

18.6.3 The feasibility of using goods suppliers that utilise railhead facilities will be considered in accessible locations, including the following which are nearest to the construction site access points north and south of the River Thames:

- London Concrete – Transport Avenue, Brentford (for the Mogden STW site, via Mogden Lane, A310 Twickenham Road, B454 Spur Road, B454 Syon Lane, and A4 Great West Road)
- Day Aggregates – Kingston Road, Tolworth (via A307 south, A243 Brighton Road, and A3 Kingston Bypass)

18.6.4 For construction sites north of the river, including Mogden STW, the use of barges has not been proposed due to lack of direct access to the river. The option to use existing wharves on the River Thames in proximity to Mogden STW and completing the last leg of the journey using HGVs will be investigated further to consider the benefits compared to materials being transported by HGV only. South of the river, the use of barges has been investigated at the intermediate shaft location and Burnell Avenue, Northweald Lane and Tudor Drive sites for the delivery of precast segments and for removing excavated materials, but the use of barges and a jetty for transporting these is not proposed. A marine load-out facility is not considered appropriate for this Project when bearing in mind the additional HGVs required to construct the facility and the extended construction programme associated with it. Further consideration will be given for the use of water freight to transport construction materials, waste and equipment as the design develops. Potential recreational effects from water freight are considered under Chapter 16 Socioeconomic, Community, Access and Recreation.

18.6.5 Amenities on major roads including the A316, A310 and A307 corridors have not been examined in this chapter given that they are allocated freight routes and carry a significant level of HGVs. Nonetheless, the final list of amenities will be presented in the EIA following consultations with local authorities and discussions with other disciplines.

Highways

18.6.6 For the environmental assessment of traffic and movement, Rule 1 for the geographical extent of environmental assessments in the IEMA Environmental Assessment of Traffic and Movement guidance (paragraphs 2.13 to 2.22) includes highway links where traffic flows or HGV flows will increase by more than 30%, whilst Rule 2 includes highway links with more than 10% increase in total traffic flows for highway links of high sensitivity. Considering the existing baseline, absolute increases in HGV flows are likely to exceed the 30% threshold at the following traffic count locations:

- Dukes Avenue, between Riverside Drive and Hardwicke Road
- Sandy Lane, between Ham Street and A307 Portsmouth Road
- A307 Upper Ham Road, between B352 Ham Gate Avenue and Church Road
- A307 Portsmouth Road, between Uxbridge Road and Catherine Road
- A243 Upper Brighton Road, between A243 Brighton Road and A3210 Kingsdown Road

18.6.7 Links on the affected road network that do not currently exceed this threshold have not yet been scoped out, given that the quantities are subject to change for the final design, and the predicted future baseline to be used will be extracted from LoHAM. Nonetheless, the minor roads on the affected road network are considered most likely to exceed this threshold or exceed the 10% increase of total vehicle flows threshold where they are of high sensitivity. Therefore, assessments for severance, pedestrian delay, and intimidation impacts for these roads have been scoped in.

18.6.8 Given the minimal volumes of HGV and LGV movements required for the operation and maintenance of the facilities, assessment of these impacts is proposed to be scoped out.

Characterising impacts and effects

18.6.9 The assessment of the value, sensitivity and significance of the impacted resource or receptor, as well as the overall scope, character and importance of the resulting effect would be considered. Furthermore, paragraph 3.9 of DMRB LA 104[506] standard stipulates the necessity to determine if the expected impact will be of a short, medium, or long duration, and whether its nature will be permanent or temporary.

18.6.10 The magnitude of construction impacts will be based on the distribution and quantities of vehicle movements to and from the shaft sites. To determine the significance of the impacts, these will be considered relative to the baseline traffic conditions.

18.6.11 As they are not located in the vicinity of the shaft locations, it is expected that the material suppliers with railheads at the identified locations will have a

limited impact on minor roads on the local affected road network. Nonetheless, this is expected to reduce vehicle miles overall as these sites can be accessed prior to reaching the SRN.

Determining the sensitivity of receptors

18.6.12 Table 3.2 in DMRB LA 104[507] identifies the following scales of sensitivity for the identified receptors and resources. Moreover, Table 3.11 in DMRB LA 112[508] provides a similar 5-point scale for subcategories of receptors, including: private property and housing, community land and assets, development land and businesses, agricultural land holdings, and walking/cycling/horse riding (WCHR). The sensitivity of WCHR receptors is directly influenced by the traffic volumes and transport characteristics – these are defined by quantified daily traffic volume thresholds and the characteristics of defined trails and routes.

18.6.13 These sensitivity criteria are summarised in Table 18.11.

Table 18.11 Sensitivity of receptors

Value (sensitivity) of receptor/ resource	Typical description (DMRB LA 104)	Typical description WCHR only (DMRB LA 112)
Very high	Very high importance and rarity, international scale, and very limited potential for substitution.	National routes with frequent daily commuter or recreational use, regular use by vulnerable users and with little or no potential for diversion. Joins or alongside roads with greater than 16,000 vehicles per day.
High	High importance and rarity, national scale, and limited potential for substitution.	Regional routes with frequent daily commuter or recreational use and with limited potential for diversion. Joins or alongside roads with 8,000 to 16,000 vehicles per day.
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution.	PRoW mainly for recreational use and where alternatives routes are available. Joins or alongside roads with 4,000-8,000 vehicles per day.
Low	Low or medium importance and rarity, local scale.	PRoW mainly for recreational use and which are scarcely used or fallen into disuse. Joins or alongside roads with less than 4,000 vehicles per day.
Negligible	Very low importance and rarity, local scale.	N/A

Determining the magnitude of impacts

18.6.14 Paragraph 3.3 of the IEMA guidance identifies the key impacts that are most important when assessing the magnitude of traffic impacts from an individual development. The impacts and levels of magnitude are discussed below:

- Severance – changes in traffic of 30%, 60% and 90% are regarded as resulting in minor, moderate and major changes in severance, respectively
- Driver delay – delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system. Estimates of the changes in vehicle delays will be assessed using industry standard software such as Junctions 9 and LinSig
- Pedestrian delay – the delay to pedestrians, as with driver delay, is only significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system. An increase in total traffic of approximately 30% can double the delay experienced by pedestrians attempting to cross a road and would be considered 'major'
- NMU amenity – an indicative threshold for judging the significance of changes in pedestrian amenity is where the traffic flow (or its HGV component) is halved or doubled. It is, therefore, considered that a change in the traffic flow of -50% or +100% would produce a 'major' change in pedestrian amenity
- Fear and intimidation – Table 3.3 within the IEMA guidance (IEMA, 2023) provides four thresholds; high, medium, low, and negligible. These thresholds are determined through a scoring approach in which the degree of hazard is estimated based on 18-hour traffic volumes (2-way) and average vehicle speeds for each assessed highway link. The level of change from the baseline is then used to determine the magnitude of impact likely to be experienced
- Road safety – professional judgement would be used to assess the implications of local circumstances, or factors which may elevate or lessen risks of accidents. This could include increases in traffic, as well as environmental factors such as increases in the occurrence of fog and ice on the surrounding road network
- Hazardous/large loads – estimates will be made of the number of abnormal loads and their timing within the construction programme. Professional judgement will be used to assess their implications upon local circumstances

Determining the significance of impacts

18.6.15 To determine the overall significance of effects, the combination of the receptor sensitivity and magnitude of impact will be applied as summarised in Table 18.12, which is broadly based upon Table 3.8.1 of DMRB LA 104.

Table 18.12 Significance of effect

		Magnitude			
		Negligible	Minor	Moderate	Major
Sensitivity	Negligible/Low	Negligible	Negligible	Slight	Moderate
	Medium	Negligible	Slight	Moderate	Major
	High/Very High	Slight	Moderate	Major	Major

Traffic Assessment

Methodology – Road transport

18.6.16 The traffic assessment will be based on the peak year of construction. A future baseline will be developed for the affected road network by using outputs from LoHAM. This model represents the road network within the M25 boundary at a detailed level, which is suitable for estimating the predicted traffic flows on the affected road network at the commencement and completion of the construction works. The assessment of environmental impacts for traffic and transport will:

- Present the final quantities of materials and equipment and translate them to vehicle demand
- Identify dangerous, hazardous, and abnormal loads required for the scheme's construction (the detailed assessment and approval process will be undertaken by the contractor prior to construction)
- Identify the workforce demand and propose a traffic management solution
- Identify the proposed traffic routing option(s)
- Identify the traffic demand during the construction, operation, and maintenance of the facilities. Assess the impacts of these against the future baseline
- Quantify and assess any significant impacts and their environmental implications. This includes:
  - Traffic volume analyses to compare conditions without the works and the peak period of construction deliveries

  - Stand-alone junction modelling to assess whether there are any significant impacts on the performance of key junctions with the local minor roads on the affected road network
  - Swept path analysis for all junctions with minor roads to verify the feasibility of HGV access along the route
- Assessing the magnitude of impacts on all transport users and sensitive receptors, including severance for NMUs accessing key PRoW and amenities, and identifying the extent of air quality and noise impacts
- Abnormal Indivisible Loads (AILs) will be required for transport of large plant and equipment to and from the sites. The components of a TBM would be delivered to the Mogden STW for assembly on site, while the TBM would be disassembled on the Burnell Avenue Site and transported offsite. For these vehicles, the Special Types General Order (STGO) process would be followed. A tracking assessment might be required to determine whether the abnormal vehicle can successfully negotiate the route from the origin to the destination.

Methodology – River transport

18.6.17 The impact of changes to the levels and flows of the tidal River Thames during periods of operation will be assessed and the level of disruption determined taking into consideration allowances for variations in baseline river transport. Following the modelling of the likely reduction in water levels during the main operation periods for the Project, an assessment of the likely impacts to river users and vessels will be conducted based on the duration of potential delays to their movements and changes in surface area affecting useable navigable space within the Tideway. Records of vessels, licences and timetables within the stretch of the Tideway downstream of the Teddington Weir will be obtained from the Port of London Authority and through desk based appraisals.

Assessment of cumulative effects

18.6.18 Any cumulative impacts of the construction traffic for the proposed development with the construction traffic generated by other developments in the vicinity that might share the same access routes during the proposed construction programme will be considered in Chapter 19 Cumulative Effects.

18.7 Mitigation

18.7.1 A Traffic and Transport chapter will be prepared as part of the ES which will help identify the most suitable routing option. By managing the movement of construction vehicles through appropriate routing, this will contribute to the avoidance and prevention of significant adverse impacts.

Primary

18.7.2 Primary (inherent/embedded) mitigation are measures that form an intrinsic part of the Project design for the purpose of avoiding, preventing or minimising likely significant adverse environmental effects. These are particularly relevant for any temporary construction traffic impacts experienced on-site or connecting to the site.

18.7.3 Where intersected, diversions of any PRoW routes may be provided as mitigation if any WCHR routes are permanently severed. Appropriate signage and lighting would be provided for non-motorised users.

18.7.4 Improved road markings and parking restrictions on minor roads with direct access to construction sites may be implemented on highways with direct access to construction sites to prevent any operational or maintenance vehicles from being parked at inappropriate locations that could impact non-motorised users and local residents.

18.7.5 Similarly, temporary road markings and parking restrictions may be implemented so that construction HGVs can safely traverse the local roads to access the MRN.

Secondary

18.7.6 Secondary (foreseeable) mitigation is that designed to mitigate specific impacts identified by the EIA process. These aim to avoid or reduce the likely significant effects identified. The requirement for such measures will be dependent on the assessment conclusions. Some measures that may be included for as part of the Project are identified below.

18.7.7 To minimise the impact of construction works, it is essential that HGVs are routed to the nearest SRN via the most direct designated freight routes where feasible. HGV routing will utilise MRNs, which are typically regionally important A-roads and the TLRN, to access the designated freight routes, namely the LLCS permitted routes.

18.7.8 Where sections of construction routes fall on roads outside of the LLCS permitted routes, HGVs are prohibited from using such sections during the restricted hours (Monday-Friday from 21:00-07:00 including bank holidays, and Saturday 13:00-Monday 07:00), unless registered to the LLCS and permission is obtained from Local Councils. It is expected that HGV traffic from the scheme will not occur during these restricted hours.

18.7.9 Each shaft site would have a potential route coming in from the SRN, MRN (TLRN), and accessing the site through residential areas. These routes would be used by HGVs which would typically be delivering materials for the construction of the tunnel, shafts, TTP and any associated ancillary infrastructure, cofferdams and shaft and tunnel concrete segments as well as removing excavated waste generated from the construction sites.

18.7.10 A CLP (based on TfL guidance) may be produced to help implement any necessary travel demand measures and monitor them for compliance. The development of a plan to manage the movement of the workforce to and from the site to minimise the impacts of motorised traffic on local residential roads may also form part of the mitigation measures of the Project. Such a plan would typically include adherence to safety standards and programmes, environmental standards and programmes, and adherence to designated routes.

18.7.11 Where potential significant adverse severance impacts are identified, temporary mitigation such as amended PRoW routing and priority crossing infrastructure can be provided where appropriate.

Tertiary

18.7.12 Tertiary (inexorable/good practice) mitigation are measures to reduce reasonably foreseeable impacts, will be required regardless of any EIA assessment, as they are imposed. This may include conducting road safety audits to reduce any impacts on road safety once Teddington DRA is operational, in accordance with the DMRB GG 119 Road Safety Audit.[509]

18.8 Summary of Scope for the EIA

18.8.1 Based on the above, Table 18.13 shows the potential traffic that are proposed to be scoped in or out of further assessment, along with the rationale for the choice.

Table 18.13 Traffic Impacts scoped in and out of further assessment

Potential effect	Scoped In/Out	Rationale
Construction phase		
Construction traffic – Impact on traffic flows and operation of junctions on affected road network	IN	As a result of works on all sites there will be additional traffic on the existing road network (including existing roads affected by construction workforce movements), during the construction phase of the Project. This would include any routes to and from existing railheads in Brentford and Tolworth along with routes to off-site wharfs if investigations find their use to be feasible. Sensitive receptors are positioned within the construction traffic study area, as such, the potential for temporary increased traffic congestion and traffic delays at junctions during the construction phase of the Project cannot be discounted at this time.
Severance	IN	During construction there will be an increase in traffic, including HGVs, with resultant increase in traffic on the affected road network associated with each of the site. The consequence of this could be potential temporary disruptions to local communities, such as limiting access to essential services like schools, healthcare, and shops. Analysing severance impacts ensures that measures can be taken to maintain community cohesion and connectivity, mitigating negative social and economic effects on residents.
Driver delay	IN	Construction activities at each site can lead to increased traffic congestion and longer travel times over a temporary period. This can have significant economic implications for businesses reliant on timely deliveries and employees commuting to and from work. Addressing potential delays is crucial for maintaining the overall efficiency of the transport network and reducing disruption.
Pedestrian delay	IN	Construction activities have the potential to temporarily affect pedestrian mobility and access to services as a result of increased construction traffic levels and temporary traffic diversion measures for any of the sites. Delays can pose significant safety risks and disrupt daily routines.

Potential effect	Scoped In/Out	Rationale
NMU amenity	IN	During construction, likely temporary disruptions such as increased traffic and temporary changes to PRoW and cycleways may pose safety issues and/or reduce accessibility, particularly for the construction sites south of the River Thames. The evaluation of such potential impacts is crucial for maintaining quality of life and promoting sustainable and active transport options.
Fear and intimidation	IN	During construction, machinery, increased HGV traffic and temporary changes to PRoW/cycleways could create intimidating conditions for vulnerable road users across the affected road network. Such impacts have the potential to temporarily alter how people use movement infrastructure. This is particularly important for vulnerable groups such as children, the elderly, and people with disabilities.
Road user and pedestrian safety	IN	During construction there will be a temporary increase in traffic, including HGVs, on the affected road network which can increase the risk of road accidents. Ensuring safety for all road users is essential for compliance with health and safety regulations, preventing accidents and protecting public health. The assessment will therefore consider risks to the safety of all road users relating to the road network affected by activity at each site, including pedestrians. It will also consider the impact of severe weather events where relevant. Rail will not be considered given that railway services are unlikely to be impacted by the construction activity. No railway lines are directly intersected or severed by the affected road network (i.e.: by level crossings).
Hazardous/large loads	IN	During construction, there will be a requirement to transport abnormal loads and potentially dangerous material to the sites. The STGO process would be followed for the components of a TBM, which would be delivered to the Mogden STW and removed from the Burnell Avenue site. Such movements could lead to potential traffic disruption and safety risks to other road users.

Potential effect	Scoped In/Out	Rationale
Construction traffic – impact on rail operation	OUT	There are no direct rail connections to the above ground sites and therefore any impacts on railway operation are scoped out. Similarly, any impacts on passenger rail are scoped out due to low levels of construction workforce.
Construction traffic – impact on river traffic	IN	The option to use existing wharves on the River Thames in proximity to Mogden STW and completing the last leg of the journey using HGVs will be investigated further to consider the benefits compared to materials being transported by HGV only. Further consideration will be given for the use of water freight to transport construction materials, waste and equipment as the design develops
Operational phase		
Operational and maintenance traffic – Mogden STW – impact on road traffic and road users (severance, driver delay, pedestrian delay, NMU amenity, fear and intimidation, road user and pedestrian safety, and hazardous/large loads).	OUT	There will be negligible amount of additional traffic on the existing road network (including existing roads affected by additional workforce and delivery movements), during the operational and maintenance phase of the Project. Sensitive receptors are positioned within the traffic study area, as such, the potential for increased traffic congestion and traffic delays at junctions during the operational phase of the Project is likely to be negligible.
Operational and maintenance traffic – Intermediate Shaft, Intake and Outfall facilities, and TLT connection – impact on road traffic and road users (severance, driver delay, pedestrian delay, NMU amenity, fear and intimidation, road user and pedestrian safety, and hazardous/large loads).	OUT	There will be negligible traffic additions associated with the maintenance and operations activities necessary for these facilities. These activities only occur infrequently i.e. once a year or every two years and would only incorporate a small number of vehicles at any one time. Similarly, more regular inspections of the intake and outfall assets and ancillary equipment would only require single small vehicles, occurring on a frequency set by the manufacturers and in line with Thames Water's asset management policies.

Potential effect	Scoped In/Out	Rationale
Operational impact on tidal River Thames (Tideway) levels and navigable channels.	IN	There will be some water level reductions and potential for navigable area changes during operation phase of the Project affecting the use by vessels and others in the Tideway.

19 Cumulative Effects

19.1 Introduction

19.1.1 Cumulative effects arise from impacts when existing or reasonably foreseeable future activities or developments combine to increase an environmental effect. This chapter outlines potential likely significant cumulative effects associated with the Project and how they will be assessed. Due to construction and operational phases of the Project occurring at differing times, they do not act cumulatively.

19.1.2 There are two types of cumulative assessment as set out below:

- Intra project effects – this describes the relationships between different aspects for the environmental impacts associated with a proposed development affecting the same receptor. For example, noise, dust and visual impacts may be experienced at one particular residential dwelling or area. These impacts can interact together in an additive/synergistic way
- Inter project effects – the potential for effects of the Project to combine with effects from other existing and, or approved developments in the vicinity. For example, if two building sites are active concurrently in close proximity, receptors may experience construction noise effects from both

19.2 Consultation and Engagement

19.2.1 Non-Statutory Public Consultation was undertaken from October 2023 to December 2023 to seek feedback about the site options for the Project from a variety of stakeholders such as landowners, residents, businesses, local authorities, and other statutory bodies who might be affected by or interested in the Project. In relation to cumulative effects the responses tended not to be specific with reference made as to whether the assessments undertaken to support any application would have regard to other current and proposed developments. Consideration of relevant other existing and, or approved developments that may have a cumulative effect with the Project are to be included in the cumulative chapter of further assessment reports including the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES).

19.2.2 Engagement with officers of London Borough of Hounslow (LBH), London Borough of Richmond upon Thames (LBR), and Royal Borough of Kingston upon Thames (RBK) relating to the assessment of cumulative effects and in particular other potentially relevant projects or activities in the locality of the Project has been undertaken through meetings in March, May and June 2024. In the meetings the Project team outlined the proposed assessment methodology including proposed Zones of Influence (ZOI) for different

environmental aspects, and sought views on relevant projects and activities to be included within the Long list of projects in accordance with Planning Inspectorate (PINS) advice on Cumulative Effects Assessments(see section Stage 1: Long).

19.3 Legislation and Policy Context

19.3.1 Section 5.10 outlines the requirement for the Cumulative Effects Assessment.

19.3.2 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) set out in paragraph 5(e) of Schedule 4 that an ES should include:

19.3.3 'the *cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources'*.

19.3.4 The requirement to consider cumulative effects is also outlined in planning policy. The National Policy Statement (NPS) for Water Resources Infrastructure[510] includes:

- Paragraph 3.1.3 states that '*In considering any proposed development, and in particular, when weighing its adverse impacts against its benefits, the Examining Authority and the Secretary of State should take into account its potential adverse impacts, including any longer-term and cumulative adverse impacts, as well as any measures to avoid, reduce or compensate for any adverse impacts*'
- Paragraph 3.2.6 states that '*When considering significant cumulative effects, any Environmental Statement should provide information on how the effects of an applicant's proposal would combine and interact with the effects of other development (including projects for which consent has been granted)*'
- Paragraph 3.2.7 states that '*The Examining Authority should consider how significant cumulative effects, and the interrelationship between effects, might as a whole affect the environment, even though they may be acceptable when considered on an individual basis or with mitigation measures in place*'

19.3.5 In addition to the policy set out in the NPS for Water Resources Infrastructure, the Project will also have regard to other relevant legislation, policy, standards and guidance for cumulative effects assessment as listed in Table 19.1.

Table 19.1 Relevant legislation, policy and guidance

Relevant legislation, policy and guidance
Legislation
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ("the EIA Regulations") (UK Government, 2017)[511]
National policy
NPS for Water Resources Infrastructure 2023[512]
The National Planning Policy Framework (NPPF) (2023)[513]. It is noted that the NPPF (2024) was under consultation until September 2024
Regional policy
The London Plan 2021[514]
Local policy
The LBH Local Plan 2015 - 2030[515] and the LBH Local Plan 2020 - 2041 (emerging policy)
The LBR Local Plan 2015 - 2018[516] and the LBR 'Pre-Publication' Draft Local Plan (2024)[517]
The RBK Core Strategies 2012[518] and Kingston's Local Plan 2019 - 2041[519]
Guidance
Planning Inspectorate (PINS) advice on Cumulative Effect Assessments (2024)[520]

19.4 Existing Environment and Baseline Conditions

Study area

19.4.1 PINS advice on Cumulative Effect Assessments states that for inter project effects *'Nationally significant infrastructure projects (NSIPs) often have a broad spatial and temporal Zone of Influence (ZoI)'.* As such, there is not normally a fixed study area within which to assess inter project cumulative effects as it depends on the geographic extent of the effects of the development and where they intersect with effects from other existing and, or approved development.

19.4.2 To define the inter project cumulative effects study area, the individual aspect assessments determine the ZOI of the Project and estimate where they may intersect with the ZOIs of other proposed developments (for example, a 500m study area is used for historic environment).

19.4.3 The study area for intra project cumulative effects is the area where the ZOI of one or more assessment aspects interact.

Existing Baseline – Intra project cumulative effects

19.4.4 The ZOIs for the individual aspect assessments have been developed using professional judgement and knowledge of effects experienced on similar schemes to help determine the study area for the Project. These ZOIs for each of the individual environmental aspects can be found in their associated chapters. Table 19.2 summarises the ZOIs in relation to relevant environmental aspects and accord with the ZOIs that were discussed with LBH, RBK and LBR during meetings as set out in section 19.2. These will be refined as the EIA progresses.

Table 19.2 Intra project ZOIs for environmental aspect

Environmental aspect	Zone of influence
Biodiversity internationally designated sites with bats as a qualifying feature, Water Quality	10km
Townscape and Visual Amenity	Up to 2.5km
Biodiversity internationally designated sites excluding bats as a qualifying feature, national and local designations, protected and notable species, Aquatic Ecology, Water Resources and Flood Risk	2km
Air Quality	1km
Noise and vibration, Dust, Historic Environment, Ground Conditions and Contaminated Land, Priority Habitat, Community, Access and Recreation (Community accessibility and severance, and Recreation)	Up to 500m

19.4.5 With regard to other environment aspects comprising Carbon and Climate Change, Waste and Materials, Human Health, Socioeconomic, Traffic and Transport, and Major Accidents and Disasters the ZOIs are varied with consideration of potential cumulative effects forming part of these assessments. Details of which are contained in the relevant chapters of the Environmental Impact Assessment (EIA) Scoping Report.

Existing Baseline - Inter project cumulative effects

19.4.6 The baseline conditions presented in this EIA Scoping Report reflect the situation at the time of writing. In addition to discussions with the LBH, LBR and RBK in relation to other relevant existing and, or approved developments in proximity to the Project an initial review of other existing and, or approved developments[521] in proximity to the Project has been undertaken, using

professional judgement to identify developments that could potentially result in cumulative effects with the Project. This review has considered:

- Nationally significant infrastructure projects on the PINS website
- Marine Licence activities/development
- Transport and Works Act applications
- Parliamentary/Hybrid Bills
- Major proposed developments (as defined by The Town and Country Planning (Development Management Procedure) (England) Order 2015
- Major Development Plan allocations

19.4.7 The baseline conditions for each of the aspects, including likely receptors, have been detailed in the respective chapters in this Scoping Report and are not repeated here.

19.5 Sensitive Receptors and Potential Environmental Effects

Intra project cumulative effects

19.5.1 The types of environmental effect and associated sensitive receptors are the same as those set out in the technical aspect chapters.

Inter project cumulative effects

19.5.2 The types of environmental effect and associated sensitive receptors are the same as those set out in the technical aspect chapters.

19.6 Assessment Methodology

Introduction

19.6.1 There are different methods associated with assessing intra and inter project effects as set out below.

19.6.2 Assessment will be iterative, proportionate, commensurate with the level of available information and precautionary, assuming a realistic worst case.

19.6.3 Significance criteria will account for:

- duration, i.e. will the effect be temporary or permanent
- extent, e.g. the geographical area of an effect
- type, e.g. whether additive or synergistic
- frequency
- 'value' and resilience of the receptor
- the likely success of mitigation

19.6.4 The generic EIA matrix approach to combining receptor sensitivity/value and impact magnitude to derive effect significance will be used (see Figure 5.2 in Chapter 5 EIA Methodology).

Intra project cumulative effects

19.6.5 There is no standard approach to intra project cumulative assessment. Professional judgment will be used to identify whether potential cumulative effects could occur across the aspects. Likely significant effects are outlined within the aspect Chapters 6 to 18 within this EIA Scoping Report.

19.6.6 Cumulative effects would be reported in the chapter that deals with the receptor affected, for example, where noise and air quality may cumulatively affect a designated ecological site, the cumulative effect would be reported in the Terrestrial or Aquatic Ecology chapter. Where a receptor is shared by an aspect (e.g. a residential receptor affected by noise, air quality and landscape) cumulative effects will be reported where considered most appropriate. While intra project cumulative effects will be identified and reported in the aspect chapters, a summary will be presented in the cumulative effects chapter of the ES.

Inter project cumulative effects

19.6.7 PINS advice on Cumulative Effect Assessments sets out a staged approach to the assessment process as follows:

- Stage 1: Establishing the Long list
- Stage 2: Establishing the Short list
- Stage 3: Information gathering
- Stage 4: Assessment

19.6.8 It is not considered practicable to undertake a meaningful assessment of the likely significance of potential cumulative effects at this early stage. However, PINS advice on Cumulative Effect Assessments states that '*Stages 1 – 2 should be undertaken early in the pre-application phase and ideally before requesting a scoping opinion. Applicants should make use of the EIA scoping process to provide information on the CEA [cumulative effects assessments], to ensure it is focussed and proportionate'*. Therefore, an initial Stages 1 - 2 assessment has been undertaken which will be refined later during the EIA process as the relevant ZOIs are further developed, and the long and Short list are reviewed.

Stage 1: Long list

19.6.9 In accordance with PINS advice on Cumulative Effect Assessments, the first task in establishing the Long list of relevant 'other existing development and, or approved development(s)' is to determine the 'search area'. The 'search area' is determined by consideration of the ZOI for each environmental aspect assessed.

19.6.10 Also, in accordance with PINS advice on Cumulative Effect Assessments, the developments identified within the 'search area' are divided into the Tiers set out in Table 19.3.

Table 19.3 PINS advice on Cumulative Effect Assessments –Assigning certainty to 'other existing development and, or approved development'

Tier	Description
Tier 1	Under construction Permitted application under the Planning Act or other regimes but not yet determined Submitted application under the Planning Act or other regimes but not yet determined All refusals subject to appeal procedures not yet determined
Tier 2	Projects on the Planning Inspectorate's programme of projects
Tier 3	Projects on the Planning Inspectorate's programme of Projects where a scoping report has not been submitted Identified in the relevant Development Plan and emerging Development Plans, with appropriate weight given as they near adoption, recognising that there will be limited information available on the relevant proposals Identified in other plans and programmes, as appropriate, which set the framework for future development consents or approvals, where such development is reasonably likely to come forward

19.6.11 Where other projects are expected to be completed before construction of the proposed NSIP and the effects of those projects are fully determined, effects arising from them should be considered as part of the baseline and may be considered as part of both the construction and operational assessment. Where Tier 1 developments have been granted in 2024 and prior, it is assumed they are likely to have been constructed and will form part of the baseline.

19.6.12 Tier 1 projects are the most likely to have associated environmental information available for use in an assessment of cumulative effects. Tier 3 projects are the least likely to have this information.

19.6.13 The following types of existing and/or approved developments (from 1 June 2019 to 31 May 2024) have been considered for inclusion in the Long list:

- NSIPs
- Marine Licenses/Development
- Transport and Works Act Orders
- Parliamentary Acts (Hybrid)

- Major Development Applications (LBH, RBK and LBR)
- Major Local Plan Allocations (LBH, RBK and LBR)

19.6.14 For the purposes of this EIA Scoping Report the search area for consideration of relevant NSIPS, Marine licences, Transport and Works Act Orders and Parliamentary Acts has been undertaken based on 10km to reflect the largest ZOI set out in Table 19.2 related to potential effects on European designated sites. In terms of major Local Authority applications and major Local Plan allocations a search area of 3km has been adopted reflecting the nature of the environment and type and scale of these developments in relation to the aspect ZOIs. Table 19.2 provides more detail on the ZOI for the environmental aspects.

19.6.15 This search has been undertaken using the planning portals of Local Planning Authorities (LPAs) including RBK, LBH and LBR and PINS (2024). These desk based searches identified potential other existing and, or approved developments in proximity to the Project to create an initial Long list (Appendix G Cumulative Assessment Stage 1 and Stage 2 list).

19.6.16 Planning applications which have been withdrawn or rejected (those outside of the 6 month appeal period) are scoped out. Allocated sites in Local Plans or other Development Plans which are not yet subject to planning applications, are included despite the development or operational timeframe of these proposals sites not yet being known. This is due to the medium term lead time associated with the Project construction, which is expected to take 3 years (2029 – 2031). During the EIA process, should any new developments subject to major planning applications come forward, they would then be further considered, as appropriate, in consultation with the LPAs.

19.6.17 The initial Long list provided in Appendix G will be continually revisited throughout the EIA process as the relevant ZOIs are further developed (see paragraphs 19.4.4).

Stage 2: Short list

19.6.18 Following the completion of the desk study Long list and in line with Stage 2 within PINS advice on Cumulative Effect Assessments , it was then deemed appropriate to apply threshold criteria to exclude or include 'other existing and, or approved development' from the Long list to develop a Short list.

19.6.19 This was undertaken to keep the inter project cumulative effects assessment proportionate and focussed. The criteria adopted to help determine if other existing and, or approved developments are taken through to further assessment stages included consideration of overlaps in temporal scope; the scale and nature of the other existing and, or approved development; whether there is a source-pathway-receptor link as well as professional judgement.

19.6.20 Other existing and, or approved developments are prioritised by Tier. Most Tier 1 (under construction, permitted, submitted), or even Tier 2 (EIA Scoping) developments may not apply given the long period before construction starts (5 years) and the construction period of the Project. In addition, Tier 3 (scoping not submitted, in Local Development and other plans) development timescales are uncertain. Other existing and, or approved developments to be constructed earlier than the Project will be included within the baseline as potential receptors and as contributors to baseline environmental conditions, where feasible.

19.6.21 An initial Short list has been developed from the initial Long list using project professional judgement based on temporal alignment, relative scale and proximity, type of development, nature of potential impact, capacity of the receiving environment, source-pathway-receptor relationships. Appendix G Cumulative Assessment Stage 1 and Stage 2 list includes a combined table comprising the Short list and Long list. Other existing and, or approved developments in the Short list are indicated under the column 'Progress to Stage 3/4' where those which are will show as 'Yes'. This table will be reviewed throughout the EIA process. Where other existing and, or approved developments have temporal overlap and/or likely significant environmental effect with the Project, then they will be included in the Short list.

19.6.22 In addition, rather than scoping in smaller scale individual allocations or developments, the cumulative effects assessment will consider total housing and employment growth as a whole within the ZOI.

19.6.23 Minor developments have not been assessed at this stage of the EIA process as it is assumed, due to their scale and nature, that they will be complete by the time that the Project construction will begin (expected to commence 2029) and, therefore, such minor developments will become part of the baseline environment and become potential environmental receptors.

19.6.24 When creating the Long list during Stage 1, multiple planning applications can be identified that relate to individual projects. Applications that have been refused planning permission have been excluded from the Short list, where they are outside of the 6 month appeal process, as these projects do not have permission to be constructed and, therefore, to have potential for cumulative effects.

19.6.25 In considering the scale and nature of the developments as part of the criteria to develop the Short list consideration has been given to the indicative thresholds identified under Schedule 3 of the EIA Regulations 2017. Although it is recognised that the thresholds are indicative only, and the sensitivity of the receiving environment are also factors to consider in the determination of other existing and, or proposed developments to be included in the Short list.

19.6.26 Known developments which could potentially be scoped into the cumulative effects chapter of the ES are shown in the provisional Short list in Appendix G Cumulative Assessment Stage 1 and Stage 2 list. However, note that at this early stage this does not represent a final 'Short list' of developments. Both the Long and Short lists will continue to be developed during the EIA process as the relevant ZOIs are determined, and in consultation with the LPAs.

Stage 3: Information Gathering

19.6.27 In the ES, each environmental aspect will consider the cumulative effects of the Project with other identified existing and, or approved development. Professional judgment will be used to determine the potential for cumulative effects, which will be identified as direct, indirect, short-term or long-term, permanent or temporary. The likely magnitude of effect will be determined, any proposed mitigation measures would be considered, and the residual significance of the effects will be assessed.

19.6.28 Detailed information about each development will be collected, wherever available, for a robust assessment of cumulative effects. In particular, the temporal information of other existing and, or approved developments (i.e. does the construction phase overlap with the Project) as well as the nature of their likely effects.

19.6.29 Other existing and, or approved developments where there is insufficient information available on which to conduct an evidence-based assessment will either be excluded or only a high level qualitative assessment will be undertaken, dependent on the level of up-to-date information available. In practice this is likely to include developments which may be in a Local Plan but for which no definitive information, such as at least pre-application consultation or EIA scoping, is available.

Assumptions, limitations and uncertainties

19.6.30 As set out above, for some of the identified other existing development and/or approved developments, relevant information for assessment may not be available or will not be sufficiently detailed to undertake a robust assessment. Where this is the case, the assessment will be based upon clearly reported assumptions and professional judgement.

19.7 Summary of Scope for the EIA

EIA scope for the preferred option

19.7.1 Both intra and inter project cumulative effects are scoped into the assessment. Inter project effects associated with the 'Short-list' identified in Appendix G are currently scoped in but this is likely to change as more information becomes available and other applications are made within the relevant ZOIs.

19.8 Next Steps

19.8.1 The Long and Short list of other existing development and/or approved developments will be revised throughout the EIA process, in consultation with the LPAs.

20 Major Accidents and Disasters

20.1 Introduction

20.1.1 This chapter considers potential significant adverse effects of the Project on the environment, deriving from the vulnerability of the Project to risks of relevant major accidents and/or disasters. As such, both the vulnerability of the Project to a major accident or disaster and the potential for the Project to cause a major accident or disaster are discussed, and their inclusion within the Environmental Impact Assessment (EIA) is determined.

20.1.2 Major accidents and disasters represent significant events that can have immediate or delayed severe impacts on human health, welfare, and the environment that would necessitate extensive resources beyond those of the Project to manage.

20.1.3 The Institute of Environmental Assessment and Management (IEMA) has prepared a Primer to guide the assessment of this aspect in EIA. This Primer is entitled 'Major Accidents and Disasters in EIA' (2020) (hereafter referred to as 'the Primer')[522]. The Primer on page 3 provides the following definitions:

- "*A major accident is an event (for instance, train derailment or major road traffic accident) that threatens immediate or delayed serious environmental effects to human health, welfare and/or the environment and requires the use of resources beyond those of the client or its appointed representatives (i.e. contractors) to manage. Major accidents can be caused by disasters resulting from both man-made and natural hazards*".
- "*A disaster is a man-made/external hazard (such as an act of terrorism) or a natural hazard (such as an earthquake) with the potential to cause an event or situation that meets the definition of a major accident*".

20.1.4 For the purposes of this chapter, the term 'major accidents' is taken to include both major accidents and disasters, as defined above. The assessment considers the occurrence of extreme and highly unlikely incidences. As such, whilst this chapter draws on baseline information relevant to other environmental aspect chapters of this EIA Scoping Report, it considers scenarios that the other environmental aspect assessments would not reasonably cover.

20.1.5 This chapter should be read in conjunction with the following, where common receptors have been considered and where there is an overlap or relationship between the assessment of effects:

- Description of the Project provided in Chapter 2 The Project
- Chapter 11 Ground Conditions and Contaminated Land
- Chapter 13 Water Resources and Flood Risk
- Chapter 14 Human Health

- Chapter 15 Carbon and Climate Change
- Chapter 18 Traffic and Transport

20.2 Consultation and Engagement

20.2.1 Non-Statutory Public Consultation was undertaken from October 2023 to December 2023 to seek feedback about the site options for the Project from variety of people such as landowners, residents, businesses, local authorities, and other statutory bodies who might be affected by or interested in the Project. In relation to major accidents, no specific comments were received; however, as stated above, the focus of this engagement was on site options.

20.2.2 As work on the Project progressed, a series of pre-application meetings were held jointly between the Applicant and the three Local Planning Authorities (LPAs) within which the Project is located. Refer to section 4.5 in Chapter 4 Consultation and Engagement for further details of these engagements. These meetings included a series of technical subject-specific meetings to inform about issues of importance to the EIA scoping process. None of the meetings covered major accidents.

20.3 Legislation and Policy Review

Legislation

20.3.1 The inclusion of major accidents in the EIA process for the nationally significant infrastructure planning regime is mandated by EU Directive 2014/52/EU and was transposed into UK law through the Infrastructure Planning (EIA) Regulations 2017 (the 'EIA Regulations').

20.3.2 Schedule 4, paragraph 8 of the EIA Regulations 2017 requires: "*A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned*."

20.3.3 The underlying objective is to ensure that appropriate precautionary actions are taken for those developments which: *"…because of their vulnerability to major accidents and/or natural disasters (such as flooding, sea level rise, or earthquakes), are likely to have significant adverse effects on the environment.*" (paragraph 15, European Union Directive 2014/52/EU).

20.3.4 The EIA Regulations cite Directive 2012/18/EU (major accident hazard registered sites) and Council Directive 2009/71/Euratom (nuclear sites) as examples of risk assessments to be included in EIA. However, these are not relevant to this Project.

20.3.5 The Health and Safety at Work etc. Act 1974 and relevant statutory provisions provide the overarching framework in relation to the regulation of industrial health and safety. It applies to the construction, operation and maintenance of the Project and:

- Places general duties on, e.g. employers, people concerned with premises, manufacturers and employees. Health and Safety Regulations made under this Act contain more detailed provisions
- Provides the framework for the regulation of industrial health and safety in the UK. This Act and its supporting regulations mandate that a comprehensive risk assessment is conducted for all workplace activities, ensuring that any foreseeable risks to persons in workplaces are minimised to 'As Low As Reasonably Practicable' (ALARP)

20.3.6 The Management of Health and Safety at Work Regulations 1999 require employers to conduct comprehensive risk assessments, including risks related to major accidents and disasters. They must establish procedures for serious and imminent danger, ensure competent personnel manage these risks, and provide adequate safety information and training. These measures are crucial for preventing and mitigating the impacts of major accidents.

20.3.7 Further pertinent, although not exhaustive, legislation in relation to the Project is provided below.

- The Construction (Design and Management) (CDM) Regulations 2015 ('the CDM Regulations') and accompanying guidance. These place particular duties on clients, designers, and contractors to ensure that health and safety are considered throughout the lifecycle of a project, from inception, design, construction, operation and subsequent demolition and removal. Under the CDM Regulations, designers must avoid foreseeable risks and mitigate the risk of accidents to ALARP

20.3.8 The Control of Major Accident Hazards Regulations 2015 (COMAH 2015) implements comprehensive measures to manage and mitigate risks associated with industrial activities involving hazardous substances in the UK, superseding the 1999 regulations. COMAH 2015 enacts the Seveso III Directive (except for land-use planning requirements) and introduced several updates, including an expanded list of dangerous substances and updated emergency planning requirements. Key duties include developing a Major Accident Prevention Policy (MAPP), maintaining rigorous safety management systems, preparing safety reports, and conducting both internal and external emergency plans. The COMAH 2015 regulations emphasise stringent controls, proactive and reactive safety strategies, coordination with local authorities, and robust regulatory oversight to prevent and respond effectively to major industrial accidents. Moreover, COMAH 2015 requires public disclosure of relevant safety information, cooperation

among establishments to manage domino effects, and enforcement by a competent authority, such as the HSE, to ensure compliance.

20.3.9 An Environmental Permit will be required for the discharge of recycled water and abstraction of river water in accordance with the Environmental Permitting (England and Wales) Regulations 2016 (Environmental Permitting Regulations).

20.3.10 The Water Resources Act 1991 includes provisions relevant to major accidents and disasters primarily through its regulations concerning the management of water resources. Specifically, the Act empowers agencies to take necessary actions to conserve and manage water resources, which could be critical in responding to or mitigating the impact of major accidents or disasters that affect water supply or quality. The Act also mandates coordination with water undertakers to ensure the resilience and safety of water infrastructure under adverse conditions. These provisions help ensure that water resources are managed in a way that can prevent or respond effectively to major incidents, safeguarding public health and environmental safety.

20.3.11 Water companies are empowered by the Water Industry Act 1991 to implement by-laws addressing operational safety, access, and security. These include the Security and Emergency Measures Direction (SEMD), a statutory document produced under the provisions of section 208 of the Water Industry Act 1991. It places upon Water Companies the requirement to *'keep under review and revise such plans as it considers necessary to ensure the provisions of essential water supply …and wastewater services at all times'.*

20.3.12 The Civil Contingencies Act 2004 sets out a framework for emergency preparedness in the UK. The Act defines what an emergency is, facilitates effective multi-agency working at the local level, and provides emergency powers that allow the government to react quickly and make temporary special legislation in the most serious of emergencies.

National Policy

20.3.13 National planning policies relevant to major accidents and pertinent to the Project are provided below.

- The National Policy Statement (NPS) for Water Resources Infrastructure[523] outlines key safety principles for water infrastructure projects. It mandates engagement with relevant bodies such as local authorities and the Health and Safety Executive (HSE) on safety matters. Furthermore, the NPS recognises that national security considerations apply across all national infrastructure sectors. Department for Energy, Food and Rural Affairs acts as the sector sponsor department for the water sector with lead responsibility for security matters and for directing

the security approach to be taken. It works with the Centre for the Protection of National Infrastructure to reduce the vulnerability of the water sector to terrorism and other national security threats

- Annex G of the Planning Inspectorate's advice on Working with public bodies in the infrastructure planning process references the HSE role in infrastructure planning. This Annex states that the two main considerations for the HSE for Nationally Significant Infrastructure Projects are:
  - Does the Proposed Development have the potential to cause a major accident and
  - Is the Proposed Development vulnerable to potential major accidents?
- The National Planning Policy Framework (NPPF) (2023) [524] also contains policy guidance pertinent to the consideration of major accidents with particular reference to paragraph 96 in relation to public safety and paragraphs 157 to 179 in relation to meeting the challenge of climate change, flooding, coastal change and water pollution
- The draft NPPF 2024, which was undergoing engagement until 24 September 2024, calls for the inclusion of safety assessments in planning decisions, particularly for projects that might pose risks due to hazardous substances, infrastructure failures, or their proximity to sensitive areas such as populated regions. Local planning authorities must consult relevant bodies for developments near major hazard sites, installations, or pipelines. Policies should address security threats and natural hazards, ensuring public safety through up-to-date threat assessments. Development around defence sites must prevent adverse impacts. Land suitability should account for contamination risks, requiring remediation where necessary
- The National Planning Practice Guidance: Water supply, wastewater, and water[525] advises on integrating water supply, wastewater, and water quality considerations into planning to mitigate risks related to major accidents and disasters. It emphasises sustainable infrastructure design, proactive planning, and coordination across agencies to ensure water management systems are resilient, reducing the likelihood and impact of environmental disasters and ensuring compliance with regulatory standards
- The Institute of Environmental Management and Assessment Major Accidents and Disasters in EIA: A Primer (IEMA) (2020)[526] strengthens the focus on major accidents and disasters in the EIA process and has been used to guide the development of this chapter

Local Policy

20.3.14 The following local policies are relevant to the Project:

- Hounslow Local Plan (2015)
- Richmond upon Thames Local Plan (2018)
- The Emerging Richmond Local Plan (Regulation 19) is at an advanced stage and has recently been at Examination. The Emerging Kingston Local Plan is currently at Regulation 18 engagement with Regulation 19 engagement due in the autumn
- Kingston upon Thames Core Strategy (2012)

20.3.15 The Project will conform to the Project's Code of Construction Practice (CoCP) and the relevant Thames Water Standards.

20.3.16 A summary of the key legislation, policy and guidance for this aspect is provided in Table 20.1.

Table 20.1 Relevant legislation, policy and guidance

Relevant legislation, policy and guidance
Legislation
Infrastructure Planning (EIA) Regulations 2017
Water Resources Act 1991
Water Industry Act 1991
Control of Major Accidents Hazard Regulations 2015
Construction (Design and Management) Regulations 2015
Health and Safety at Work Act 1974
The Management of Health and Safety at Work Regulations 1999
The Civil Contingencies Act 2004
National policy
NPS for Water Resources Infrastructure 2023[527]
The NPPF (2023)[528]. It is noted that the NPPF (2024) was under consultation until September 2024
National Planning Practice Guidance: Water supply, wastewater and water quality (UK Government, 2019)
Local policy
The London Plan 2021[529]

Relevant legislation, policy and guidance
The London Borough of Hounslow (LBH) Local Plan 2015 - 2030[530] and the LBH Local Plan 2020 - 2041 (emerging policy)
The London Borough of Richmond upon Thames (LBR) Local Plan 2015 - 2018[531] and the LBR 'Pre-Publication' Draft Local Plan (Regulation 19) (2024) [532]
The Royal Borough of Kingston upon Thame (RBK) Core Strategy 2012[533] and Kingston's Local Plan 2019 - 2041 (emerging policy)[534]
Guidance
Institute of Environmental Management and Assessment Major Accidents and Disasters in EIA: A Primer[535]

20.4 Existing Environment and Baseline Conditions

Study Area

20.4.1 The Project components, as described in Chapter 2 The Project, have been considered in the development of the study area. Equally, it is recognised that the consequences of major accidents could extend beyond the immediate environs of the Project.

20.4.2 For clarity, the elements of the Project include the Western Work Area, the Eastern Work Area, and associated infrastructure and the conveyance tunnel and its connections. See Figure 1.1 in Chapter 1 Introduction of this EIA Scoping Report.

20.4.3 The Mogden sewage treatment works (STW) is classified as a Lower Tier Control of Major Accident Hazards Regulations 2015 (COMAH) site[536]. The facility is subject to the COMAH Regulations because certain dangerous substances (flammable liquids and gases) present at or above the qualifying thresholds in the Regulations. There are two types (tiers) of establishment that are subject to COMAH, known as 'Upper Tier' and 'Lower Tier', depending on the quantity of dangerous substances they hold. Upper Tier establishments will hold greater quantities of dangerous substances, meaning that additional requirements are placed on them by the Regulations.

20.4.4 Other STWs that are in proximity to the proposed works are also classified as Lower Tier COMAH sites, including the Hampton, Ashford Common, and Walton on Thames STWs.

20.4.5 The study area encompasses a 1km buffer around the Mogden STW site and a 500m buffer around the conveyance route and other above ground sites (see Figure 20.1). This study area reflects the different environments that reflect the Project and considers that the consequences of major accidents

could extend beyond the immediate environs. The study area has been informed by professional judgement and based on the nature of the potential major accident or disaster identified, as well as the range of potential receptors present.

20.4.6 To identify receptors, the following study areas have been considered:

- For water, see Chapter 10 Aquatic Ecology and Chapter 13 Water Resources and Flood Risk
- For biodiversity, see Chapter 9 Terrestrial Ecology and Chapter 10 Aquatic Ecology
- For infrastructure, see Chapter 18 Traffic and Transport
- For land contamination, see Chapter 11 Ground Conditions and Contaminated Land
- For health care and disease, see Chapter 14 Human Health
- For residential areas, see Chapter 6 Air Quality, Chapter 7 Noise and Vibration and Chapter 16 Socioeconomic, Community, Access and Recreation
- For historic assets, see Chapter 8 Historic Environment
- For climate, see Chapter 15 Carbon and Climate Change

Figure 20.1 Study Area

Baseline Conditions

20.4.7 Baseline conditions in relation to possible major accidents have been derived from the following sources:

- OS mapping
- Information available on the Health and Safety Executive website
- British Geological Survey information
- UK current National Risk Register (2023)[537]
- London Risk Register (2022)
- UK Met Office data, in particular, the UK Climate Projections (UKCP)[538]
- Existing Thames Water policy and process documents
- Thames Water corporate and project-specific risk assessments

20.4.8 Information contained within other matter chapters as mentioned in paragraph 20.1.5.

20.4.9 With regard to the above data, this section seeks to identify potential major sources of hazard that could generate a major accident through potential linkages with the Project. In addition, this section identifies the main risk themes and types of risk that have been identified at a national and regional level. Risks are considered when assessing the likelihood of the Project causing or increasing the likelihood of a major accident.

20.4.10 Major utilities in the study area are mapped in Figure 20.2[539] and include:

- Underground powerlines
- There are several below-ground parking areas and tunnels in the study area
- There are several railway lines within the study area

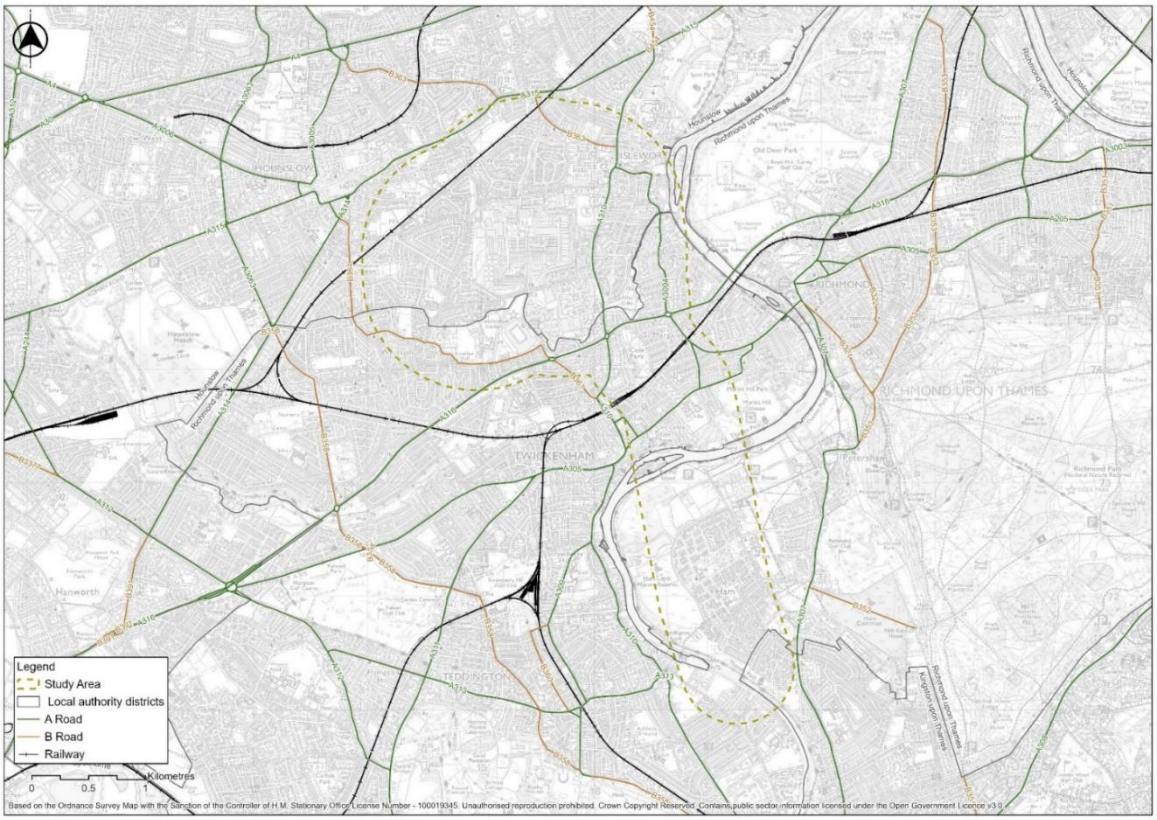


Figure 20.2 Major Utilities in the Study Area

20.4.11 Active landfills[540] in the vicinity of the Study Area are mapped in Figure 20.3 and include:

- Harmondsworth Landfill, Holloway Lane, Sipson UB7 0AE (approx. 9.58 km northwest of the Mogden STW)
- Stanwell Quarry, Stanwell Moor Road, Stanwell TW18 1QF (approx. 11km west of the Burnell Avenue outfall/intake site)
- Home Farm Extension Landfill, Laleham Road, Shepperton TW17 0NF (approx. 11.98km west of the Burnell Avenue outfall/intake site)
- Suez Recycling and Recovery UK Ltd. 21 Chessington Road (approx. 9.42km south southeast of the Burnell Avenue outfall/intake site)
- Beddington Landfill Site, 105 Beddington Lane, Beddington CR0 4TD (approx. 13.2km southeast of the Burnell Avenue outfall/intake site)

20.4.12 Historic landfills[541] in the vicinity of the study areas include:

- Broom Road Recreation Ground, Broom Road (700m south of the Burnell Avenue intake/outfall site)
- Bridge Road, Woodlands, Hounslow, London (690m north of Mogden STW)
- London Road Sports Ground, London Road (690m north of Mogden STW)

- Jersey Gardens, Osterley, Hounslow, London (1.8km north of Mogden STW)
- Crane Avenue Allotments, St. Maragrets, Isleworth, Hounslow, London (530m southeast of Mogden STW)
- Redlees Park, Isleworth, Hounslow, London (adjacent east of Mogden STW)
- Lampton Park Extension, Lampton Park (2.1km northwest of Mogden STW)
- Brookwood Road, Lampton (1.7km northwest of Mogden STW)
- Mogden Sewage Works, Lampton Road, Mogden (at the site of Mogden STW)
- Lampton Island, Lampton Road (1.96km northwest of Mogden STW)
- Lampton Park Extension, Lampton Park (2.1km northwest of Mogden STW)
- Twickenham Trading Estate, St. Maragrets, Isleworth, Hounslow, London (480m south of Mogden STW)
- Whitton Dean, Isleworth, Hounslow, London (450m southwest of Mogden STW)
- Ivybridge, Isleworth, Hounslow, London (160m south of Mogden STW)

Figure 20.3 Historic and authorised (active) landfills within and close to the Study Area

20.4.13 The screening process determines whether a project is likely to be vulnerable to major accidents and accidents and disasters.
Key considerations include:

- Whether the Project itself is a source of hazard
- Interaction with external hazards that could make the Project vulnerable
- Potential for the Project to increase risks to environmental receptors if an accident or disaster occurs

20.4.14 If vulnerabilities are identified, they must be addressed through design measures, legal requirements, and good practices.

20.4.15 There is a need for an integrated approach to assessing how different types of risks interact or compound, including climate change, flooding, and human health.

20.4.16 Current appraisal of the design identified several safety risks linked to the construction and operation of bankside or in-channel outfall structures. These include potential construction accidents due to the need for cofferdams and heavy machinery, increased navigational hazards for vessels due to temporary and permanent in-water structures, and risks to public safety from debris and sediment build-up affecting water quality and fish migration. Maintenance challenges, particularly for in-channel structures, pose significant health and safety risks for workers requiring specialised equipment and divers. Moreover, potential ecological impacts, such as disruption to fish behaviour and habitat, necessitate careful planning and mitigation strategies.

20.4.17 The National Risk Register (NRR) (2023) is the UK government's assessment of the most serious risks facing the UK. These risks are split into categories that include:

- Natural and environmental hazards, including coastal, fluvial, ground and surface water flooding risks, storms, drought, heavy rain, and extreme temperatures, solar flares affecting satellites and power grids, volcanic ash clouds affecting air travel, air pollution, risks due to seismic activities, and wildfires
- Terrorism and cyber threats, including attacks on infrastructure, terrorist attacks targeting areas with high population density, cyber-attacks and chemical, biological, radiological and nuclear (CBRN) attacks
- Accidents and systems failures, including loss of gas and electricity systems, major fires and accidental fires or explosions
- Human, animal and plant health, such as epidemics and pandemics, which affect public health
- Societal risks, such as strikes and labour disputes, riots and civil unrest

20.4.18 The London Risk Register (2022) underpins the work of the London Resilience Forum and is designed to provide a summary of the main risks affecting Greater London. The risk themes in this register are similar to those

in the NRR – Very High Risks include flooding, pandemic flu and storms and gales, High Risks include transport accidents, utility failures, cold weather and snow, and terrorism.

20.4.19 The UKCP 2018 findings indicate increasing climate risks in London, including hotter, drier summers and wetter winters. Projections show increased frequency and intensity of extreme weather events, such as heatwaves and heavy rainfall, which heighten the risk of flooding and heat stress. Sea level rise poses additional flood risks, necessitating robust adaptation and mitigation strategies to enhance urban resilience and protect vulnerable populations.

20.5 Potential Risks that Could Result in a Major Accidents or Disasters

20.5.1 An initial hazard and identification assessment using professional judgement in consultation with the design engineers and Thames Water was carried out, to establish the vulnerability of the Project to major accidents and disasters.

20.5.2 The probability of each hazard occurring and the consequence/effect if one did occur were assessed to determine whether they could be classed as major events.

20.5.3 In accordance with the categories defined in the NRR[542], the following event categories were considered:

- Human, animal and plant health
- Natural and environmental
- Geological
- Hydrological
- Engineering
- Industrial accidents
- Accidents
- Terrorism/civil unrest/public disorder

20.5.4 Each of the eight event categories defined in paragraph 20.5.3 were considered to define a Long list of potential risks which could occur as a result of or affect the Project. The risks were also assessed to determine whether they could ultimately result in a major event.

20.6 Sensitive Receptors and Potential Environmental Effects

20.6.1 The Project is located in west London, encompassing the LBH, LBR, and RBK. These areas have a diverse mix of densely populated residential zones, commercial areas, and significant green spaces like Richmond Park and Bushy Park.

20.6.2 The Project's urban setting heightens the importance of managing major accidents and disasters risks effectively to protect densely populated areas and critical infrastructure.

20.6.3 The proximity to the River Thames introduces specific vulnerabilities, particularly related to flooding and water contamination. For the aspect of major accidents and disasters, the matters and receptors that could be vulnerable to a major accident in relation to the Project are:

- Historic environment (designated sites and buildings, known and unknown archaeology)
- Terrestrial and aquatic ecology (protected sites and habitats, protected species)
- Ground conditions and contaminated land (soils and groundwater)
- Water resources and flood risk (surface water)
- Socioeconomic, community, access and recreation (properties and businesses)
- Local residents, workers, and transient populations in the vicinity of the Project are at risk from construction activities, potential chemical spills, and health impacts related to air and water quality
- The River Thames and surrounding green spaces host diverse wildlife that could be affected by pollution, habitat disruption, and water contamination
- Key infrastructure such as transportation networks, sewage treatment works, and energy supply systems are susceptible to structural hazards, flooding, and fire risks

20.6.4 This section sets out the likely significant effects of the Project in relation to the potential for major accidents. It follows the methodology set out within the IEMA Primer and assumes that the relevant embedded measures and good practice measures are in place before assessing the effects. However, it highlights relevant documents that support this, to aid transparency in the conclusions drawn.

20.6.5 This assessment has focused on identifying the potential sources of a hazard that could result in a major accident, whether there are potential pathways to receptors that could cause a significant environmental effect and, finally, whether existing design measures, legal requirements, codes and standards adequately control the potential major accident. This process is set out within Figure 1 of the IEMA Primer and is replicated in Figure 20.4.

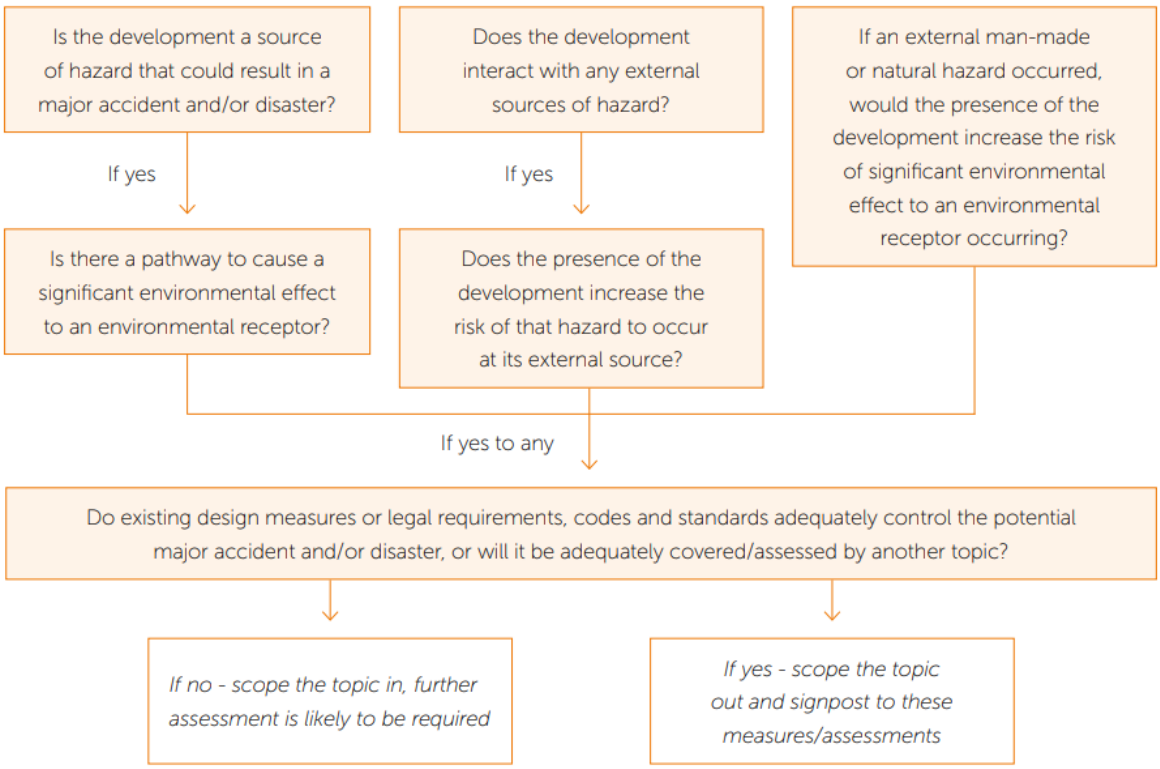


Figure 20.4 Scoping Decision Process Flow

**Source: IEMA Primer*

20.6.6 In line with the decision process shown in Figure 20.4, a three staged process has been undertaken to identify potential major accidents, these being:

- Identify a list of possible hazards that could result from the Project, which have a pathway that could cause a significant environmental effect on an environmental receptor
- Consider whether the Project could interact with any existing sources of hazard, including those identified in the baseline section of this chapter
- Consider whether a risk event, such as those identified in the baseline section of this chapter, would increase the potential environmental effect on a receptor through the presence of the Project

20.6.7 Given the Project's proximity to the River Thames, flooding is a primary concern. The area may be susceptible to both fluvial and surface water flooding, especially under extreme weather conditions exacerbated by climate change. This risk is significant as flooding can disrupt construction, damage infrastructure, and affect the operational integrity of water management facilities.

20.6.8 Storms, heavy rainfall, or extreme temperatures could pose significant risks. Such events can lead to operational disruptions, damage to construction materials and equipment, and pose safety risks to workers and the local

population. The potential for climate change to impact the frequency and severity of these meteorological hazards in future is discussed in Chapter 15 Carbon and Climate Change.

20.6.9 Considering the scale of the Project and the involvement of large machinery and hazardous materials, industrial accidents such as chemical spills or machinery failure could have severe implications. These incidents can lead to environmental pollution, human health hazards, and substantial delays in Project timelines.

20.6.10 The Project relies on existing infrastructure, which may be aged or not initially designed to support the new loads and types of activity introduced by this large-scale Project. Failures could arise from overstressed utilities, including electrical and water supply systems, particularly where modifications or upgrades are inadequately managed.

20.6.11 The integration of digital technologies in managing modern infrastructure projects introduces vulnerabilities to cyber-attacks, which could affect operational technology, safety systems, and data security. Additionally, physical security threats, such as acts of terrorism or vandalism, are significant, given the Project's visibility and importance.

20.6.12 While not directly caused by the Project, a public health emergency, like a pandemic, can significantly impact Project timelines, labour availability, and safety protocols. The COVID-19 pandemic illustrated how such events could drastically affect construction projects.

20.6.13 Although less common in the UK, seismic activities or subsidence could impact large-scale projects, especially those involving tunnelling and underground construction activities. Geological assessments should determine the Project's vulnerability to such risks. Note that land stability issues that could have major accidents and disasters implications are not considered in Chapter 11 and will be addressed as part of the design of the Project.

20.6.14 Based on the findings related to Ground Conditions and Contaminated Land (Chapter 11), Water Resources and Flood Risk (Chapter 13), Human Health (Chapter 14), and Carbon and Climate Change (Chapter 15), the following significant effects related to major accidents and disasters have been considered in this assessment:

- Flood risk due to the Project's location and potential impact on local flood risks, especially with changes in weather patterns
- Extreme weather events, such as storms, heavy rainfall, or extreme temperatures, which may be exacerbated due to climate change: Significant due to the potential impacts of climate change on the Project's resilience and the increased risk of extreme weather events affecting the Project operations

- Industrial accidents such as such as chemical spills or machinery failure. This is significant due to the density of urban development, the number of potential receptors, and proximity to the strategic water resource (Thames River)
- Failures in existing electrical and water supply systems, which could impact operations
- Human health impacts due to events resulting in human illness or injury: Significant due to potential impacts on the local population, particularly from construction-related activities and the presence of contaminants
- Public health emergencies that impact Project timelines, labour availability, and safety protocols
- Vulnerabilities to cyber-attacks given reliance on digital systems.
- Risk of seismic activities or subsidence that could impact tunnelling and underground construction activities

20.6.15 These hazards and risks, along with consideration of pathways and existing design measures (primary mitigation), legislative requirements or codes (tertiary mitigation) to control the potential for a major accident, are summarised in Table 20.2. This includes both construction and operational phases.

20.6.16 The process in Figure 20.4 shows that where measures, legal requirements, codes and standards to be considered in the design adequately control the potential major accident and/or disaster, that this aspect can be scoped out of further assessment.

20.6.17 All of the identified aspects are considered to be scoped out of further assessment on the assumption that these would be considered in the relevant construction and operation measures, legal requirements, codes and standards.

Table 20.2 Potential Major Accident Effects (Long list)

Risk event	Source/ pathway	Receptor	Reasonable worst consequence if event occurred	Primary/tertiary mitigation	Could this lead to a major accident with primary/ tertiary mitigation in place	Is the reasonable worst case consequence managed to acceptable level with primary/ tertiary mitigation	If no what secondary mitigation is required
Ground collapse	Construction and operation - Tunnelling	Various	Ground settlement reaches surface or tunnel collapse resulting in subsidence and structural damage to buildings immediately above.	Managed via CDM: tunnel design and construction methods include risk assessment for overlying structures and monitoring or mitigation if required.	No	Yes	N/A
High voltage electricity	Construction and operation -Electrical infrastructure	Workers and local community	Electrocution, fire hazard, and power outages impacting local area.	Risks identified and managed via CDM construction planning, draft CoCP, and method statements.	No	Yes	N/A

Risk event	Source/ pathway	Receptor	Reasonable worst consequence if event occurred	Primary/tertiary mitigation	Could this lead to a major accident with primary/ tertiary mitigation in place	Is the reasonable worst case consequence managed to acceptable level with primary/ tertiary mitigation	If no what secondary mitigation is required
Explosions	Construction and operation -Use of explosives or gases	Workers and local community	Severe injuries, fatalities, structural damage, and fire hazards.	Risks identified and managed via CDM, construction planning, draft CoCP and method statements etc.	No	Yes	N/A
Major fire	Construction and operation - Combustible materials and processes	Various	Severe injuries, fatalities, structural damage, and environmental pollution.	Fire prevention measures, installation of advanced fire detection and suppression systems, and emergency response plans.	No	Yes	N/A

Risk event	Source/ pathway	Receptor	Reasonable worst consequence if event occurred	Primary/tertiary mitigation	Could this lead to a major accident with primary/ tertiary mitigation in place	Is the reasonable worst case consequence managed to acceptable level with primary/ tertiary mitigation	If no what secondary mitigation is required
Impact on water services (TLT)	Operation - Tunnel operations	Thames Water customers	Disruption of water supply, potential contamination, and health impacts.	Managed via comprehensive risk assessment, monitoring systems, and emergency response plans.	No	Yes	N/A
Impact on sewage treatment services	Operation - tertiary treatment plant (TTP) process	Local residents and environment	Release of untreated sewage, environmental contamination, and public health risks. The risk of spread of INNS is detailed in Chapter 9 Terrestrial Ecology and Chapter 10 Aquatic Ecology which details the INNS monitoring sites and	Managed via stringent operational protocols, monitoring systems, and emergency response plans.	No	Yes	N/A

Risk event	Source/ pathway	Receptor	Reasonable worst consequence if event occurred	Primary/tertiary mitigation	Could this lead to a major accident with primary/ tertiary mitigation in place	Is the reasonable worst case consequence managed to acceptable level with primary/ tertiary mitigation	If no what secondary mitigation is required
			recommended mitigation.				
Major Accidents or disasters during construction	Construction activities	Various	Injuries, fatalities, structural damage, environmental contamination, and Project delays.	Managed via robust health and safety protocols, risk assessments, and emergency response plans.	No	Yes	N/A
External Accidents affecting the Site Population within the Order Limits	Construction and operation - Proximity to transport networks and industrial areas	Site workers and local community	Injuries, fatalities, structural damage, and environmental contamination.	Managed via site-specific risk assessments, traffic management plans, and emergency response plans.	No	Yes	N/A

Risk event	Source/ pathway	Receptor	Reasonable worst consequence if event occurred	Primary/tertiary mitigation	Could this lead to a major accident with primary/ tertiary mitigation in place	Is the reasonable worst case consequence managed to acceptable level with primary/ tertiary mitigation	If no what secondary mitigation is required
Acts of Terrorism Affecting CNI and the Site Population within the Order Limits	Construction and operation - Potential targets within site	Site workers and local community	Severe injuries, fatalities, structural damage, and disruption of critical infrastructure.	Managed via security measures, collaboration with local authorities, and emergency response plans.	No	Yes	N/A
Industrial accidents such as chemical spills or machinery failure	Construction - Use of hazardous materials and heavy machinery	Workers and local environment	Severe injuries, fatalities, environmental contamination, and significant Project delays.	Managed via robust health and safety protocols, containment systems, and emergency response plans.	No	Yes	N/A

Risk event	Source/ pathway	Receptor	Reasonable worst consequence if event occurred	Primary/tertiary mitigation	Could this lead to a major accident with primary/ tertiary mitigation in place	Is the reasonable worst case consequence managed to acceptable level with primary/ tertiary mitigation	If no what secondary mitigation is required
Human health impacts due to events resulting in human illness or injury	Construction and Operation	Workers and local community	Spread of disease, severe health impacts, Project delays, and increased healthcare burden.	Managed via health and safety protocols, health surveillance, and emergency response plans.	No	Yes	N/A
Public health emergencies	Construction and Operation- Pandemic or epidemic	Workers and local community	Spread of disease, severe health impacts, Project delays, and increased healthcare burden.	Managed via health and safety protocols, health surveillance, and emergency response plans.	No	Yes	N/A
Vulnerabilities to cyber-attacks	Operation - Digital infrastructure	Operational systems	Disruption of operations, data breaches, and potential safety risks.	Managed via cybersecurity measures, regular	No	Yes	N/A

Risk event	Source/ pathway	Receptor	Reasonable worst consequence if event occurred	Primary/tertiary mitigation	Could this lead to a major accident with primary/ tertiary mitigation in place	Is the reasonable worst case consequence managed to acceptable level with primary/ tertiary mitigation	If no what secondary mitigation is required
				audits, and emergency response plans.			
Fluvial and surface water flooding especially under extreme weather conditions exacerbated by climate change	Construction and Operation - River Thames and surface water runoff	Various	Flooding of construction sites and operational areas, structural damage, environmental contamination, and Project delays.	Managed via enhanced flood defences, adaptive water management systems, and real-time monitoring technologies.	No	Yes	N/A
Extreme weather events such as storms,	Construction and Operation - Weather conditions	Various	Disruption of construction and operational activities, damage to structures,	Managed via adaptive construction and operational plans, real-time weather	No	Yes	N/A

Risk event	Source/ pathway	Receptor	Reasonable worst consequence if event occurred	Primary/tertiary mitigation	Could this lead to a major accident with primary/ tertiary mitigation in place	Is the reasonable worst case consequence managed to acceptable level with primary/ tertiary mitigation	If no what secondary mitigation is required
heavy rainfall, or extreme temperatures			health risks to workers, and environmental impacts.	monitoring, and emergency response plans.			
Failures in existing electrical and water supply systems	Operation - Aged or overstressed infrastructure	Various	Disruption of operations, potential safety hazards, and delays in Project timelines.	Managed via infrastructure upgrades, regular maintenance, and contingency plans.	No	Yes	N/A
Seismic activities or subsidence	Construction and Operation - Geological conditions	Various	Structural damage to tunnels and infrastructure, potential collapse, and significant Project delays.	Managed via geological assessments, robust design standards, and real-time monitoring technologies.	No	Yes	N/A

Selection of risks requiring assessment (Short list)

20.6.18 The Long list was refined using the following questions (based on IEMA, 2023): Would each of the events/risks:

- Pose a specific risk to the Project?
- Require a level of response outside of the resources of the Project, for example, from the emergency services?
- Is the Project a source of hazard that could result in a major accident and/or disaster and is there a pathway to cause a significant effect to a receptor?
- Does the Project interact with any external hazard (such as a terrorist attack or extreme weather event)? If yes, does the presence of the Project increase the risk of that hazard occurring at its source?
- If an external man-made or natural hazard occurred, would the presence of the Project increase the risk of a significant effect occurring?
- Do existing design measures or legal requirements, codes and standards adequately control the potential major accident and/or disaster or will it be adequately covered/assessed by another assessment aspect?

20.6.19 Professional judgement has been applied when considering the environmental constraints in the area and the nature of the Project.

20.6.20 Events/risks which could affect other developments in the area but would not affect the Project, as well as those already addressed by existing or standard controls, have been scoped out along with low-consequence (regardless of likelihood) events; high-likelihood, high-consequence events that should be designed out in any case and any hazards for which there is no credible source-pathway-receptor linkage.

20.6.21 If mitigation proposed either as part of the Project design (primary mitigation) or legislation and standards (tertiary mitigation) would apply that would prevent or reduce the risk to a level that is not likely to cause a significant effect, then the events were scoped out.

20.6.22 The results from the initial review are presented in Table 20.3.

Table 20.3 Potential major accidents and disasters effects

Potential effect	Study area	Scoped In/Out
Occupational Health and Safety	Construction and operation	OUT
Major Accidents involving High Voltage Electricity	Operation only	OUT
Major Accidents involving the new TTP process	Operation only	OUT
Major Accidents involving fire	Operation only	OUT
Major Accidents or disasters involving the spill of chemicals or waste materials	Operation only	OUT
Major Accidents or disasters during construction	Construction only	OUT
External Accidents affecting the Site Population within the Order Limits	Construction and operation	OUT
Acts of Terrorism Affecting CNI and the Site Population within the Order Limits	Construction and operation	OUT
Industrial accidents such as such as chemical spills or machinery failure	Construction and operation	OUT
Human health impacts due to events resulting in human illness or injury	Construction only	OUT
Public health emergencies	Construction and operation	OUT
Vulnerabilities to cyber-attacks	Operation only	OUT
Fluvial and surface water flooding, especially under extreme weather conditions, exacerbated by climate change.	Construction and operation	OUT
Extreme weather events, such as storms, heavy rainfall, or extreme temperatures	Construction and operation	OUT
Failures in existing electrical and water supply systems	Operation only	OUT
Major Accidents or disasters leading to structural hazards, including seismic activities or subsidence	Operation only	OUT

20.6.23 The major accidents and disasters aspect has been scoped out of the Environmental Statement (ES) on the assumption mitigation proposed either as part of the Project design (primary mitigation) or legislation and standards (tertiary mitigation) would prevent or reduce the risk to a level that is not likely to cause a significant effect.

20.6.24 Other events/risks that will be considered in the ES are as follows:

- Healthcare (i.e. potential for algal blooms), inland flooding and groundwater levels (flooding) will be considered in the Water Environment aspect (see Chapter 13 Water Resources and Flood Risk)
- Mobilisation of contamination will be considered in the Geology and Soils aspect (see Chapter 11 Ground Conditions and Contaminated Land)
- Traffic accidents, rail accidents, accidents involving pedestrians and severe weather events (fog and ice) will be considered in the Traffic and Transport aspect (see Chapter 18 Traffic and Transport)

20.6.25 It is recommended that the 'Description of the development' chapter include a risk assessment to identify risks associated with the Project and set out the embedded design features and management controls to demonstrate that risks are mitigated, and the resulting outcome aligns with the principle of being ALARP.

20.6.26 Key embedded measures to be considered in the design include:

- Design Standards - Compliance with relevant design standards and good practices to ensure structural integrity and safety. Existing water and electrical infrastructure should be upgraded or reinforced to handle increased loads and new operational demands
- Enhanced Flood Defences - Adaptive flood defences and water management systems that accommodate current and future climate scenarios
- Real-time monitoring technologies - To detect and respond to structural, mechanical, or digital vulnerabilities swiftly
- Emergency Response and Preparedness Plans – Development and updating of comprehensive emergency response plans in consultation with local emergency services
- Preparedness and response strategies for public health emergencies, including labour management and safety protocol adaptations
- Fire Prevention and Control - Installation of advanced fire detection and suppression systems
- Containment Systems - Implementation of secondary and tertiary containment systems to manage spills and prevent environmental contamination
- Risk Management Framework - Establishment of a robust risk management framework, incorporating regular audits and updates to ensure continuous improvement and adherence to safety standards
- Health and Safety Protocols: Rigorous health and safety protocols, especially concerning industrial hazards and public health risks

20.7 Conclusions

20.7.1 The preliminary assessment of major accidents and disasters for the drought resilience scheme Project demonstrates that with the embedded environmental measures, the potential risks are adequately managed.

20.7.2 The major accidents and disasters aspect has been scoped out of the ES on the assumption mitigation proposed either as part of the Project design (primary mitigation) or legislation and standards (tertiary mitigation) would prevent or reduce the risk to a level that is not likely to cause a significant effect.

20.7.3 Other events/risks that will be considered in the ES are as follows:

- Healthcare (i.e. potential for algal blooms), inland flooding and groundwater levels (flooding) will be considered in the Water Environment aspect (see Chapter 13 Water Resources and Flood Risk)
- Mobilisation of contamination will be considered in the Geology and Soils aspect (see Chapter 11 Ground Conditions and Contaminated Land)
- Traffic accidents, rail accidents, accidents involving pedestrians and severe weather events (fog and ice) will be considered in the Traffic and Transport aspect (see Chapter 18 Traffic and Transport)

20.8 Next Steps

20.8.1 Engagement will take place with relevant authorities and interested parties regarding the risks that have been identified in this chapter and the proposed approach and mitigation measures.

21 Scope Summary and Structure of Environmental Statement

21.1 Introduction

21.1.1 This chapter summarises:

- The aspects and matters that are proposed to be scoped into and out of the Environmental Impact Assessment (EIA) for the Project
- The proposed content of the Environmental Statement (ES)
- The next steps as the Project moves forward

21.2 Aspects Proposed to be Scoped In and Out of the EIA

21.2.1 Table 21.1 summarises the aspects and matters that are proposed to be scoped in and out of the EIA for either the construction or operational activities, taken from the Chapters 6 to 20 of this report. This is based on the baseline and current Project proposals and whether the Project is likely to result in significant effects on relevant receptors with identified pathways to effect. Where the environmental matter is associated to either only construction or operational activities, 'N/A' is used to indicate the one it is not relevant to. The rationales for these scoping conclusions are set out within the individual aspect chapters (Chapters 6 to 20).

21.2.2 This EIA Scoping Report is submitted to the Planning Inspectorate (PINS) under the Infrastructure Planning (EIA) Regulations 2017. PINS will review this report, take account of comments provided by consultees, and provide a Scoping Opinion. The Scoping Opinion will confirm which aspects are to be scoped in or out of the EIA process, and the Preliminary Environmental Information (PEI) Report and ES will be based on the Scoping Opinion adopted by the Secretary of State.

Table 21.1 Scoping Summary

Environmental aspect	Environmental matter	Scoped In/Out	
		Construction	Operation
Air Quality (see Chapter 6)	Ecological receptors: Vehicle exhaust emissions	IN	OUT
	Ecological receptors: Non road mobile machinery, generator and combustion plant emissions	IN	N/A
	Ecological receptors: Dust	IN	N/A
	Human receptors: Vehicle exhaust emissions	IN	OUT
	Human receptors: Non road mobile machinery, generator and combustion plant emissions	IN	N/A
	Human receptors: Dust	IN	N/A
	Human Receptors: Odour	OUT	OUT
Noise and Vibration (see Chapter 7)	Construction airborne noise and vibration	IN	N/A
	Construction vibration	IN	N/A
	Construction groundborne noise and vibration from tunnelling	IN	N/A
	Construction road noise and vibration from road traffic	IN	N/A
	Construction noise from river traffic	IN	N/A
	Operational noise from the pumping station and intake/outfall structures	N/A	IN
	Operational vibration from pumping station and intake/outfall structures	N/A	OUT

Environmental aspect	Environmental matter	Scoped In/Out	
		Construction	Operation
	Noise from the operation of the TTP	N/A	IN
	Noise and vibration from the flow of water within the underground tunnel/pipeline	N/A	OUT
	Noise during emergency conditions	N/A	OUT
	Operational road traffic noise	N/A	OUT
Historic Environment (see Chapter 8)	Mogden STW site: Unknown non-designated heritage assets (archaeological remains)	IN	OUT
	Mogden STW site: Designated heritage assets within the vicinity	OUT	OUT
	Ham Playing Fields/Ham Street Car Park: Ham House Grade II* Registered Park and Garden and Ham House Conservation Area and associated Listed Buildings	IN	OUT
	Ham Playing Fields/Ham Street Car Park: Twickenham Riverside Conservation Area	IN	OUT
	Ham Playing Fields/Ham Street Car Park: Ham Fields and Ham House and Grounds APAs	IN	OUT
	Burnell Avenue (reception shaft, connection shaft, outfall and intake) TLT connection shaft (Northweald Lane): Riverside North Conservation Area and Teddington Lock Conservation Area	IN	OUT

Environmental aspect	Environmental matter	Scoped In/Out	
		Construction	Operation
	Burnell Avenue (reception shaft, connection shaft, outfall and intake) TLT connection shaft (Northweald Lane and Tudor Drive): Ham Common and Parkleys Estate Conservation Areas and associated Listed Buildings	OUT	OUT
	Burnell Avenue (reception shaft, connection shaft, outfall and intake) TLT connection shaft (Northweald Lane): Ham Fields APAs	IN	N/A
	Burnell Avenue (reception shaft, connection shaft, outfall and intake) TLT connection shaft (Northweald Lane): Steven Eyots and Kingston Thames Riverside APA	IN	N/A
	Burnell Avenue (outfall and intake): Riverside North Conservation Area and Teddington Lock Conservation Area	IN	IN
	Tudor Drive (TLT connection shaft): Unknown non-designated heritage assets (archaeological remains)	IN	OUT
	All locations: Unknown non-designated heritage assets (archaeological remains)	N/A	OUT
Terrestrial Ecology (see Chapter 9)	Mogden STW Western Work Area (drive shaft): Habitats and species	IN	OUT
	Mogden STW Eastern Work Area (interception shaft): Habitats and species	IN	OUT
	Ham Playing Fields and Ham Street Car Park (intermediate shaft and construction laydown area): Habitats and species	IN	OUT
	Land south of Burnell Avenue (reception shaft, connection pipeline, outfall structure and ancillary infrastructure): Habitats and species	IN	OUT

Environmental aspect	Environmental matter	Scoped In/Out	
		Construction	Operation
	Intake facility, raw water conveyance shaft, pipeline and ancillary infrastructure (land south of Burnell Avenue): Habitats and species	IN	OUT
	TLT connection shaft (Northweald Lane): Habitats and species	IN	OUT
	TLT connection shaft (Tudor Drive): Habitats and species	OUT	OUT
Aquatic Ecology (see Chapter 10)	Intake/outfall site		
	Phytoplankton, phytobenthos (diatoms), aquatic macroinvertebrates, macrophytes, microalgae, fish, INNS, protected and notable species, habitats and priority habitats		
	Habitat loss/severance, changes in the flow regime and water quality, and the introduction of INNS which could result in species disturbance, injury and mortality.	IN	N/A
	Temporary disturbance and degradation of the aquatic environment due to construction noise, vibration and light pollution, as well as the potential for increased boat traffic from the use of barges for sites on the right hand bank of the river (facing downstream) (feasibility to be assessed) and potential use of temporary pontoons to transport materials during construction.	IN	N/A
	Changes to the flow regime, water quality and temperature which may result in temporary changes to the availability of habitats for aquatic species, displacement of juvenile fish, disruption to fish migration and change in level of olfactory inhibitors due to the outfall discharge for the duration of operation.	N/A	IN

Environmental aspect	Environmental matter	Scoped In/Out	
		Construction	Operation
	At intake location, potential for fish impingement/entrainment on intake screens during the period of operation.		
	Statutory and non-statutory designated sites		
	Potential temporary changes to surface water quality from construction activities and pollution due to construction runoff. Accidental movement of bankside pollutants and INNS into waterbodies with potential effects on aquatic ecological receptors. Temporary disturbance and degradation of the aquatic environment due to construction noise, vibration and light pollution, as well as the potential for increased boat traffic from the use of barges for sites on the right hand bank of the river (facing downstream) (feasibility to be assessed) and potential use of temporary pontoons to transport materials during construction.	IN	N/A
	Potential operational phase impact on flows, velocities, and river temperature downstream of outfall. Temporary or permanent change to hydrological features, localised scour and changes in local velocities. Potential changes to surface water quality for the duration of operation including improvement in discharge water quality as a result of TTP.	N/A	IN
	Intermediate shaft sites and Northweald Lane site		
	Phytoplankton, Phytobenthos (diatoms), macrophytes, microalgae, macroinvertebrates, fish, protected and notable species, INNS, habitats and priority habitat		

Environmental aspect	Environmental matter	Scoped In/Out	
		Construction	Operation
	Habitat loss/severance, changes in the flow regime and water quality, and the introduction of INNS. This could result in species disturbance, injury and mortality.	IN	OUT
	Statutory and non-statutory designated sites		
	Potential temporary changes to surface water quality from construction activities and pollution due to construction runoff. Accidental movement of bankside pollutants and INNS into waterbodies with potential effects on aquatic ecology receptors.	IN	OUT
	TLT connection shaft (Tudor Drive) and Mogden STW		
	Phytoplankton, Phytobenthos (diatoms), Macrophytes, Macroalgae, Macroinvertebrates, Fish, INNS, protected and notable species, habitats and priority habitats		
	Not in proximity to watercourse or aquatic species/no pathways for impact	OUT	OUT
	Statutory and non-statutory designated sites		
	Not in proximity to watercourse or aquatic habitats/no pathways for impact	OUT	OUT
	Conveyance tunnel		
	All identified aquatic ecology receptors		
	Conveyance tunnel will be located at sufficient depth and within the London Clay and will not be in hydraulic connectivity with surface waters and therefore no pathways for impact identified.	OUT	OUT

Environmental aspect	Environmental matter	Scoped In/Out	
		Construction	Operation
Ground Conditions and Contaminated Land (see Chapter 11)	Damage to geological sites	OUT	OUT
	Damage or sterilisation of high grade agricultural land	OUT	OUT
	Deterioration of surface water quality within the EIA Scoping Boundary from migration of contamination	IN	OUT
	Deterioration of groundwater quality within the EIA Scoping Boundary from migration of contamination	IN	OUT
	Adverse impact to human health from potential contamination encountered	IN	OUT
	Embankment stability, collapsible ground, ground subsidence impacting the Project or causing damage to neighbouring land or property	OUT	OUT
Townscape and Visual Amenity (see Chapter 12)	Townscape character (Mogden STW)	IN	IN
	Townscape character (intermediary shaft at Ham Lands)	IN	OUT
	Townscape character (outfall and intake)	IN	IN
	Townscape character (TLT connection shaft sites)	IN	OUT
	Visual (Mogden STW)	IN	IN
	Visual (intermediate shaft at Ham Lands)	IN	OUT
	Visual (outfall and intake)	IN	IN

Environmental aspect	Environmental matter	Scoped In/Out	
		Construction	Operation
	Visual (TLT connection shaft sites)	IN	OUT
Water Resources and Flood Risk (see Chapter 13)	Surface Water Resources		
	Construction: Freshwater Thames (Burnell Avenue): hydrodynamic and geomorphological impact on channel bank and bed and from in-river construction at intake and outfall. Freshwater Thames and Thames Tideway (all above ground sites with pathways to surface waters excluding Mogden STW and Tudor Drive): potential temporary impact on surface water quality from construction phase activities (e.g. dewatering and contamination).	IN	N/A
	Construction: Duke of Northumberland River, Freshwater Thames and Thames Tideway (Mogden STW) and Freshwater Thames (Tudor Drive): Potential temporary impact on surface water quality from construction phase activities (e.g. dewatering and contamination). Duke of Northumberland's River, Freshwater Thames and Thames Tideway (All above ground sites): Potential impact on water resources from water for construction phase activities. Public foul sewer infrastructure (all above ground sites)	OUT	N/A
	Operation:	N/A	IN

Environmental aspect	Environmental matter	Scoped In/Out	
		Construction	Operation
	River Thames (Burnell Avenue): hydrodynamics and geomorphological processes due to abstraction at the intake and decreased river flow, both at the intake and between the intake and outfall. River Thames (Burnell Avenue): hydrodynamics and geomorphological processes due to input of recycled water at the outfall. River Thames (Burnell Avenue): water quality standards, underlying water chemistry and water temperature in the River Thames due to input of recycled water at the outfall. Thames Tideway (Burnell Avenue): Impact on water quality standards, underlying water chemistry and water temperature in the estuarine Thames Tideway from potential change in water quality passed forward from the freshwater River Thames (as amended by due to input of recycled water at the outfall. Thames Tideway (Mogden STW): impact on hydrodynamics, geomorphological processes and salinity in the estuarine Thames Tideway from reductions in volume of final effluent from Mogden STW at Isleworth Ait. Thames Tideway (Mogden STW): impact on water quality in the estuarine Thames Tideway from reductions in volume of final effluent from Mogden STW at Isleworth Ait.		
	Operation Lockwood Reservoir, Banbury Reservoir, High Maynard Reservoir (Burnell avenue): impacts on water quality at the Lockwood Reservoir, Banbury Reservoir and High Maynard Reservoir from water transfer and mixing of	N/A	OUT

Environmental aspect	Environmental matter	Scoped In/Out	
		Construction	Operation
	abstracted water from a different abstraction location on the River Thames. Public water supply or public foul sewer infrastructure (all above ground sites): impacts on public water supply or public foul sewer infrastructure. Off-site developed areas (all above ground sites): operation of the Project.		
	Groundwater Resources		
	Construction: Principal and Secondary superficial aquifers (TLT pipeline): impact on groundwater level and alteration of baseflow component from intake to TLT pipeline during construction. Principal and Secondary superficial Aquifers (all above and below ground sites not including the conveyance tunnel and TLT pipeline): Potential impact on groundwater level, flow and quality from construction phase activities (e.g. excavation and dewatering at shaft locations) Local licensed abstractors (Burnell Avenue): Potential temporary impact on groundwater quantity and quality from construction activities.	IN	N/A
	Construction: Principal bedrock aquifer (all above and below ground sites): impact on groundwater level and water quality from conveyance tunnel construction phase activities (e.g. excavation, dewatering, tunnelling)	OUT	N/A
	Operation:	N/A	IN

Environmental aspect	Environmental matter	Scoped In/Out	
		Construction	Operation
	Superficial Aquifers (Intake to TLT pipeline): presence of the intake to TLT pipeline has the potential to alter groundwater flow paths to the superficial deposits.		
	Operation: All aquifers (all above and below ground sites): Operation of the Project	N/A	OUT
	Flood risk		
	Construction: Off-site developed areas (all above ground sites excluding Tudor Drive): potential increased flood risk through displacing floodwater elsewhere, changing surface water runoff rates and volumes, as well as from displacement of groundwater and alteration of groundwater flows. Construction works and construction workers (all above ground sites): impact from the sites flood from rivers, watercourses or surface water.	IN	N/A
	Construction: Off-site developed areas and flood defences (all above ground sites): impacts on flood risk defences through damage from the use of construction machinery and equipment. Public foul water sewer infrastructure (all above ground sites): impacts on public foul water sewer infrastructure. Off-site developed areas (Tudor Drive): increased flood risk through displacing floodwater elsewhere, changing surface water runoff rates and volumes.	OUT	N/A

Environmental aspect	Environmental matter	Scoped In/Out	
		Construction	Operation
	Off-site developed areas (all above ground sites excluding Burnell Avenue): impacts on river and/or bank stability of the surrounding watercourses, as a result of the Project		
	Operation: Off-site developed areas and site infrastructure (Burnell Avenue)	N/A	IN
	Operation: Off-site developed areas and water related infrastructure (all above ground sites excluding Burnell Avenue)	N/A	OUT
Human Health (see Chapter 14)	Recreation, social participation and access to green and blue infrastructure	IN	IN
	Residential amenity and community wellbeing	IN	IN
	Biophysical environment	IN	IN
	Socioeconomic impacts	IN	IN
Carbon and Climate Change (see Chapter 15)	Greenhouse gases	IN	IN
	Vulnerability	OUT	IN
	In combination climate assessment	OUT	IN
Socioeconomics, Community, Access and Recreation	Socioeconomic: Employment	IN	OUT
	Socioeconomic: Economy	IN	IN
	Socioeconomic: Skills and education	IN	OUT

Environmental aspect	Environmental matter	Scoped In/Out	
		Construction	Operation
(see Chapter 16)	Community: Community amenity	IN	IN
	Community: Accessibility and severance	IN	IN
	Access: land take	IN	OUT
	Recreation	IN	IN
Materials and Waste (see Chapter 17)	Allocated material site Material availability	OUT	OUT
	Void landfill capacity and expected waste arisings	IN	OUT
Traffic and Transport (see Chapter 18)	Impact on traffic flows and operation of junctions on affected road network	IN	OUT
	Severance Driver delay Pedestrian delay NMU amenity Fear and intimidation Road user and pedestrian safety Hazardous/large loads	IN	OUT
	Traffic impact on rail operation	OUT	OUT
	Traffic impact on river traffic	IN	OUT
	Operational impact on Tideway levels and navigable channels	N/A	IN

Environmental aspect	Environmental matter	Scoped In/Out	
		Construction	Operation
Cumulative Effects (see Chapter 19) Note: Intra-development effects assessed within each aspect chapter)	Intra-development effects	IN	IN
	Inter-development effects associated with the Short list	IN	IN
Major Accidents and Disasters (see Chapter 20)	Major accidents	OUT	OUT
	Major disasters	OUT	OUT

21.3 Proposed Contents of the Environmental Statement

21.3.1 The ES will be produced in a number of volumes which are likely to be as follows:

- Volume 1 Non-Technical Summary: This will summarise the main elements of the Project and the significant environmental effects identified through the EIA process. It will be written in plain English for a non-technical audience
- Volume 2 Main Text: This will detail the findings of the EIA. It would include the chapters listed in Table 21.2, to be confirmed following receipt of the Scoping Opinion
- Volume 3 Figures: This will contain accompanying figures referred to within Volume 2
- Volume 4 Appendices: This will contain accompanying reports or documents to support Volume 2

21.3.2 The structure of the ES will reflect the aspects and matters confirmed through the Scoping Opinion provided by the Planning Inspectorate. Based on the conclusions set out in this Scoping Report, the proposed ES contents would be as set out in Table 21.2. Each of the technical aspect chapters will be undertaken by competent experts whose credentials will be included in the ES.

Table 21.2 Proposed Contents of the Environmental Statement

Chapter	Title
Non-Technical Summary	Non-Technical Summary
1	Introduction
2	Scheme Description
3	Alternatives and Design Evolution
4	Consultation and Engagement
5	Environmental Assessment Methodology
6	Air Quality
7	Noise and Vibration
8	Historic Environment
9	Terrestrial Ecology
10	Aquatic Ecology
11	Ground Conditions and Contaminated Land

Chapter	Title
12	Townscape and Visual Amenity
13	Water Resources and Flood Risk
14	Human Health
15	Carbon and Climate Change
16	Socioeconomic, Community, Access and Recreation
17	Waste and Materials
18	Traffic and Transport
19	Cumulative Effects
20	Summary

21.4 Next Steps and Environmental Documents to support the DCO

21.4.1 Following submission of this EIA Scoping Report, the Project design, planning and EIA will be progressed, as follows:

- Obtain the EIA Scoping Opinion and review scoping consultation feedback to refine the scope of the assessments and surveys and inform the PEI Report and ES
- Continue desk studies, data collation and field surveys to obtain further baseline information to support the assessment
- Continue stakeholder engagement with both statutory/prescribed consultees and with landowners and tenants
- Ongoing design evolution and identification of potential additional mitigation measures, as well as identification of potential environmental enhancements, such as biodiversity net gain (BNG)
- Preparation of a Code of Construction Practice (CoCP) and other appropriate management plans measures
- Submission of the Habitats Regulations Assessment (HRA) Stage 1 Screening Report to Natural England for comment
- Preparation of the PEI Report, which will be published as part of the engagement material presented at the Statutory Consultation
- Preparation of the ES, which will be submitted as part of the application for development consent

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

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

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

- Water Framework Directive assessment report, will be provided as a separate appendix to the ES
- Flood Risk Assessment (FRA), will be provided as a separate appendix to the ES
- Protected species survey reports and draft licence applications will be provided as required to support Letters of no Impediment from Natural England
- Consents and Agreements Position Statement
- Equality Impact Assessment (EqIA), which will provide information in terms of groups with protected characteristics under the Equality Act 2010 and social inequalities, will be relevant for consideration of vulnerable groups and health inequalities. Equality effects will be considered in a separate EqIA which will be submitted as part of the DCO application if significant impacts are identified at the screening stage

Acronyms and Glossary

Term	Definition
AADT	Annual Average Daily Traffic The total volume of vehicle traffic for a year divided by 365 days
AAWT	Annual Average Weekday Traffic The average number of vehicles (such as cars, trucks, or buses) that travel on a road or highway during a typical weekday
ADMS	Atmospheric Dispersion Modelling System
AEP	Annual Exceedance Probability
AILs	Abnormal Indivisible Loads
ALC	Agricultural Land Classification A framework for classifying land according to the extent to which its physical and chemical characteristics impose limitations on agricultural use in England and Wales
AM	Automatic Monitoring
Amenity	Public benefits or contribution that can enhance the quality of life for a community
Ancient Woodland	Designated land that has been continually wooded since at least 1600 AD in England
AOD	Above Ordnance Datum
APA	Archaeological Priority Area
APFP Regulations	Applications: Prescribed Forms and Procedure Regulations
AQFA	Air Quality Focus Area
AQMA	Air Quality Management Area An area within a local authority's boundary that is identified as an area where Air Quality Objectives are not likely to be achieved
AQOs	Air Quality Objectives Defined levels of air quality and maximum pollution limits as specified in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007
ARN	Affected Road Network
AW	Authorised Weight
AWP	Aggregate Working Party
BAP	Biodiversity Action Plan An internationally recognised program addressing threatened species and habitats and is designed to protect and restore

Term	Definition
	biological systems. The original impetus for these plans derives from the 1992 Convention on Biological Diversity
BEIS	Department for Business, Energy, and Industrial Strategy
BFI	Baseflow Index
BGS	British Geological Survey A partly publicly-funded body that provides technical advice to public and private sectors and aims to advance geological knowledge of the United Kingdom
BMV	Best and Most Versatile The most flexible, productive and efficient agricultural land in the ALC system (Grades 1, 2 and 3a)
BNG	Biodiversity Net Gain An approach to development and land management which aims to leave the natural environment, in terms of biodiversity, in a measurably better state than beforehand
BNL	Basic Noise Level
BS	British Standard
BSI	British Standards Institution
C and U	Construction and Use
CAFE	Clean Air for Europe
CAMS	Catchment Abstraction Management Survey
CAR:SOIL	Control of Asbestos Regulations 2012
CCRA	Climate Change Risk Assessment
CDE	Construction, Demolition and Excavation
CDM	Construction Design Management
CIEEM	Chartered Institute of Ecology and Environmental Management A professional membership body representing and supporting ecologists and environmental managers in the UK, Ireland and abroad
CIfA	Chartered Institute for Archaeologists
CL:AIRE	Contaminated Land: Applications in Real Environments
CLOCS	Construction Logistics and Community Safety
CLP	Construction Logistics Planning
CoCP	Code of Construction Practice A set of guidelines or principles that will be adhered to during the construction of the Project
COMAH	Control of Major Accident Hazards
CoPA	Control of Pollution Act

Term	Definition
CRTN	Calculation of Road Traffic Noise
CSM	Conceptual Site Model A conceptual site model is a representation of the characteristics of the site. It shows the possible relationships between contaminants, pathways and receptors
CTMP	Construction Traffic Management Plan A plan developed by construction project managers to manage traffic flow around construction sites
dB	Decibel
dB(A)	Decibel with A-weighting
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs The UK government department responsible for policy and regulations on the environment, food and rural affairs
DfT	Department for Transport
DLUHC	Department for Levelling Up, Housing and Communities
DMRB	Design Manual for Roads and Bridges
DoW:CoP	Definition of Waste: Development Industry Code of Practice
DRA	Direct River Abstraction
DT	Diffusion Tubes
DWi	Drinking Water Inspectorate
dWRMP	draft Water Resource Management Plan Regulatory requirement sets out how water companies intend to achieve a secure supply of water for their customers and protect and enhance the environment.
dWRMP19	draft Water Resource Management Plan 2019
dWRMP24	draft Water Resource Management Plan 2024
EA	Environment Agency Regulatory Agency in England responsible for licences and consents relevant to flooding, discharge consents, waste licences and the protection of the environment
EcIA	Ecological Impact Assessment
Effluent (Trade Effluent)	Any liquid, either with or without particles of matter in suspension in the liquid, which is wholly or partly produced in the course of any trade or industry carried on at trade premises; and in relation to any trade premises, means any such liquid which is so produced in the course of any trade or industry carried on at those premises, but does not include domestic sewage.

Term	Definition
EIA	Environmental Impact Assessment A process by which information about environmental effects of a proposed development is collected, assessed and used to inform decision making
END	Environmental Noise Directive
EPA	Environmental Protection Act
EqIA	Equality Impact Assessment
ES	Environmental Statement
ESDAL	Electronic Service Delivery for Abnormal Loads
Final Effluent	Wastewater that has had solids removed and is treated to meet strict regulatory standards ahead of being discharged to rivers and the sea.
Final WRMP	Final version of Water Resource Management Plan above
FRA	Flood Risk Assessment
FRZs	Flood Risk Zones
FtFT	Flow to Full Treatment
GCN	Great Crested Newt
GDP	Gross Domestic Product
GI	Ground Investigation
GiGL	Greenspace Information for Greater London
GLA	Greater London Authority
GLAAS	Greater London Archaeological Advisor Service
GLHER	Greater London Historic Environmental Record
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GVA	Gross Value Added
GWDTE	Groundwater Dependent Terrestrial Ecosystem
H and EqIA	Health and Equalities Impact Assessment
HDVs	Heavy Duty Vehicles
HGVs	Heavy Goods Vehicles Vehicle with a gross weight of more than 3.5 tonnes and buses
HIA	Health Impact Assessment
HRA	Habitats Regulations Assessment The process by which plans and projects are assessment for whether they are likely to have a significant effect on a European Site either alone or in combination with other plans or projects
HSE	Health and Safety Executive

Term	Definition
IAQM	Institute of Air Quality Management
ICCI	In combination climate impacts
ID	Internal Diameter
IEMA	Institute of Environmental Management and Assessment
INNS	Invasive Non-Native Species Non-native UK species of fauna and flora that are invasive e.g. Japanese Knotweed
ISO	International Organisation for Standardisation
JSNA	Joint Strategic Needs Assessments
LBH	London Borough of Hounslow
LBR	London Borough of Richmond upon Thames
LCRM	Land Contamination Risk Management
LGVs	Light Goods Vehicles
LLAQM	London Local Air Quality Management Technical
LLCS	London Lorry Control Scheme
LLFA	Lead Local Flood Authorities
LNR	Local Nature Reserve A site that is designated by the local authority under Section 21 of the National Parks and Access to the Countryside Act 1949 for nature conservation which has wildlife or geological features that are of special interest locally
LOAEL	Lowest Observed Adverse Effect Level
LoD	Limits of Deviation
LoHAM	London Highway Assignment Model
LPA	Local Planning Authorities
LTOA	Lower Thames Operating Agreement
LWR	London Water Recycling
m	Metres
MBBR	moving bed biofilm reactor
MHCLG	Ministry of Housing, Communities and Local Government
Ml/d	Mega-litres per day A megalitre is equivalent to million litres or one thousand cubic metres
Mm/s	Millimetres per second
MMP	Materials Management Plan
MoRPH	Modular River Physical Habitat

Term	Definition
MPA	Mineral Planning Authority
MPS	Metre per second
MRN	Major Road Network
NAQO	National Air Quality Objective
NAU	National Appraisal Unit
NCA	Natural Capital Assessment
NChA	National Character Area
NCR	National Cycle Routes
NERC	Natural Environment and Rural Communities
NH3	Ammonia Ammonia, primarily generated from agricultural activities, is a gas that when mixed with other gases in the atmosphere, such as nitrogen oxides and sulphur dioxide, can form particulate matter
NHBC	National House Building Council
NHLE	National Heritage List for England
NIA	Noise Important Areas
NMU	Non-Motarised User
NNG	Night Noise Guidance
NNR	National Nature Reserve
NO2	Nitrogen Dioxide An air pollutant measured in respect of Defra's AQO for the protection of human health. Nitrogen dioxide is a gas that is mainly produced during the combustion of fossil fuels
NPPF	The National Planning Policy Framework
NPS	National Policy Statement
NPSE	Noise Policy Statement England
NRMM	Non-Road Mobile Machinery
NRR	National Risk Register
NVZ	Nitrate Vulnerable Zone
Ofwat	The Water Services Regulation Authority
ONS	Office for National Statistics
OS	Ordnance Survey
PEA	Preliminary Ecology Appraisals
PEI	Preliminary Environmental Information
PINS	Planning Inspectorate
PLA	Port of London Authority

Term	Definition
PM	Particulate Matter Airborne particulate matter is made up of a collection of solid and/or liquid materials of various sizes that range from a few nanometres in diameter (about the size of a virus) to around 100 micrometres (about the thickness of a human hair)
PM10	Particulate matter with an aerodynamic diameter of 10 microns or less
PPG	Pollution Protection Guidelines
PPV	Peak Particle Velocity
PRoW	Public Rights of Way A widely known right to cross private land is known as a 'right of way'. If this is a right granted to everyone it is a 'public right of way'
RAPID	Regulators' Alliance for Progressing Infrastructure Development
RBK	Royal Borough of Kingston upon Thames
RBMP	River Basin Management Plan
Recycled water	Final effluent that has been treated through enhanced treatment processes to remove further impurities to create recycled water.
RIGS	Regionally Important Geodiversity Sites Locally designated sites of local, national and regional importance for geodiversity (geology and geomorphology) in the United Kingdom
RPG	Registered Parks and Gardens The designated register of formal historic parks and gardens maintained by Historic England. Although they are not protected by legislation they are material considerations in decision-making by local authorities
s	seconds
SAC	Special Areas of Conservation An area within the UK which has been identified as being important for a range of vulnerable habitats, plant and animal species within the European Union and are designated under the Conservation of Habitats and Species Regulations 2017
SFRA	Strategic Flood Risk Assessment
SGV	Soil Guideline Value
SINC	Site of Importance for Nature Conservation
SMI	Sites of Metropolitan Importance
SOAEL	Significant Observed Adverse Effect Level
SoCC	Statement of Community Consultation

Term	Definition
SoS	Secretary of State
SPA	Special Protection Area Sites within the UK designated under the Conservation of Habitats and Species Regulations 2017 due to their international importance for the breeding, feeding, wintering, or the migration of rare and vulnerable species of birds
SPZ	Source Protection Zone
SRN	Strategic Road Network
SRO	Strategic Resource Option
SRP	Soil Resource Plan A document used primarily in construction and land development projects to manage soil resources effectively. It provides clear guidance on how to recover, store, and reuse soils while minimising loss in quality and function
SSSI	Site of Special Scientific Interest A site designated as being of special interest for its flora, fauna or geological or physiographical features and protected under the Wildlife and Countryside Act 1981
STGO	Special Types General Order
STW	Sewage Treatment Work
SuDS	Sustainable Drainage System
SWMP	Site Waste Management Plan
TAG	Transport Analysis Guidance
TBM	Tunnel Boring Machine
TCA	Townscape Character Area
TfL	Transport for London
TLRN	Transport for London Road Network
TLT	Thames Lee Tunnel
TRL	Transport Research Laboratory
TTP	tertiary treatment plant
TVIA	Townscape and Visual Impact Assessment
TWGs	Technical Working Groups
UKCP	UK Climate Projections
UKEAP	UK Eutrophying and Acidifying Atmospheric Pollutants
UKHab	UK Habitat Classification
UKWIR	UK Water Industry Research
UNESCO	United Nations Educational, Scientific and Cultural Organization

Term	Definition
VDV	Vibration Dose Value
Wastewater	Wastewater is defined as "a combination of one or more of: domestic effluent consisting of blackwater (excreta, urine and faecal sludge) and greywater (kitchen and bathing wastewater) water from commercial establishments and institutions, including hospitals industrial effluent, stormwater and other urban run-off agricultural, horticultural and aquaculture effluent, either dissolved or as suspended matter" (Corcoran et al. 2010)
WCHR	Walking, cycling, horseriding
WEEE	Waste from Electrical and Electronic Equipment
WFD	The Water Framework Directive (2000/60/EC) is an EU directive which was transposed into law in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 ('the WFD Regulation'). It aims to achieve good status of all waterbodies (surface waters, groundwaters and the sites that depend on them, estuaries and near-shore coastal waters) and prevent any deterioration to these waterbodies. It has introduced a comprehensive River Basin Management Plan system to protect and improve the ecological quality of the water environment. It is underpinned by published environmental standards
WRMP	Water Resources Management Plan
WRSE	Water Resources South East (WRSE) is an alliance of the six water companies that supply drinking water across South East England – Affinity Water, Portsmouth Water, SES Water, South East Water, Southern Water and Thames Water. It is one of the five regional groups across England, each of which is preparing a strategic water resource plan for its region.
WTW	Water Treatment Works
ZoI	Zone of Influence The area within which receptors could potentially be affected by the construction and/or operational phases
ZTV	Zone of Theoretical Visibility A map, usually digitally produced, showing areas of land within which a development is theoretically visible.' (Guidelines for Landscape and Visual Impact Assessment (3rd edition)

Chapter 1

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Chapter 4

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Chapter 5

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Chapter 20

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