CORY

DECARBONISATION

CONSULTATION REPORT: 5.1 APPENDICES VOL. 1 PEIR PART 1

Cory Decarbonisation Project

PINS Reference: EN010128

March 2024

Regulation 5(2)(q) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulation 2009

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GLOSSARY

Term	Definition
Above-Ground Heritage Asset	An above ground building, monument, site, place, area, or landscape identified as having a degree of significance because of their historic, archaeological, architectural or artistic interest Heritage Assets include **designated heritage assets** and **non-designated heritage assets**. An above ground building, monument, site, place, area, or **landscape** identified as having a degree of significance meriting consideration in planning decisions, because of its **heritage** interest. **Heritage assets** include **designated heritage assets** and **non-designated heritage assets**.
Absorber Stack(s)	The treated flue gas is emitted into the atmosphere, via a new Absorber Stack at the top of the Absorber Column (one per Carbon Capture Plant).
Additional Mitigation	Mitigation measures that will require further activity to achieve the anticipated outcome. The effectiveness of such measures will be assessed, and appropriate mitigation will be secured by the **Development Consent Order (DCO)** or other suitable mechanism. Additional Mitigation is also known as Secondary Mitigation.
Ancient Woodland	An area that has been wooded continuously since at least 1600 Common Era (CE). Ancient Woodland is divided into ancient semi-natural woodland and plantations on Ancient Woodland sites. Both types are classed as ancient woods.
Ancillary Infrastructure	Other infrastructure, plant, works or operations necessary for the operation of the **Proposed Scheme**.
Applicant	Cory Environmental Holdings Limited, or Cory.
As Low As Reasonably Practicable (ALARP)	For a **risk** to be ALARP, the cost, time or effort involved in reducing the risk further would be grossly disproportionate to the benefit gained.
Average Annual Daily Flow (AADF)	Number of vehicles that travel past the count point on an average day of the year.
Baseline	A reference level of existing **environmental conditions** against which a development is measured and controlled.

Term	Definition
Best Available Techniques (BAT)	The available techniques which are the best for preventing or minimising **emissions** and **impacts** on the environment.
Biodiversity	The biological diversity of the earth's living resources. The total range of variability among systems and organisms at the following levels of organisation: bioregional, **landscape**, ecosystem, **habitats**, communities, **species**, populations, individuals, genes, and the structural and functional relationships within and between these different levels.
Biodiversity Net Gain	A mechanism for contributing to the recovery of nature when undertaking development. The overall purpose is to ensure the habitat is in a better state than it was pre-development.
Biodiversity Net Gain Assessment	A Biodiversity Net Gain Assessment compares baseline conditions to post-development plans. **Biodiversity Net Gain** is achieved if the post-development plans provide a net improvement to the biodiversity of a given site.
Biogenic content	Biogenic content is the carbon that is stored in biological materials, such as plants or soil.
Carbon Capture	The capture of **carbon dioxide (CO_2)** that would otherwise be emitted into the atmosphere from industrial sources.
Carbon Capture Facility	Infrastructure to capture a minimum of 95% of **CO_2** emissions from Riverside 1 and 95% of **CO_2** emissions from Riverside 2 once operational, which is equivalent to approximately 1.3Mt CO_2 per year[1]. The capture rate is the annual average. The **Carbon Capture Facility** will be one of the largest **carbon capture** projects in the UK.
Carbon Capture Technology Vendors	Vendors of technology that separates the CO_2 from flue gas emissions from industrial or power generation processes.
Climate Change	Large-scale, long term shift in the Earth's weather patterns or average temperature.
Construction Phase	The stage during which construction works for the **Proposed Scheme** will take place.
Contaminated Land	Where substances are causing or have a significant possibility to cause significant harm to people, property or

Term	Definition
	protected species; or, where significant pollution is being caused or has a significant possibility of being caused to controlled waters.
Controlled Waters	As defined under Section 104 the Water Resources Act 1991.
Cumulative Effects	The effects of the **Proposed Scheme** in cumulation with other existing development and/or approved development.
DCO Application	The application for development consent that will be submitted by the **Applicant** to the Secretary of State, in accordance with the **Planning Act 2008** (**PA2008**) and associated regulations and guidance.
Designated Heritage Assets	Designation highlights a building, site or area's special interest and value to this and future generations. It gives protection under law or policy to manage, enjoy and celebrate England's historic buildings, parks, monuments, gardens, wreck sites and battlefields.
Development Consent Order (DCO)	A Statutory Instrument (SI) made by the **Secretary of State** (SoS) pursuant to the **PA2008** (as amended) to authorise a **Nationally Significant Infrastructure Project** (NSIP) or development directed into the **PA2008** regime by a section 35 Direction, known as a Project of National Significance (PNS).
Direct Employment	An increase in employment arising from increased economic activity (jobs, expenditure or income) associated with additional income and supplier purchases.
Disaster	In the context of the **Proposed Scheme**, a naturally occurring phenomenon such as an extreme weather event (e.g., storm, flood, temperature) or ground-related hazard events (e.g., subsidence, landslide, earthquake) with the potential to cause an event or situation that meets the definition of a **Major Accident**.
Effect	The consequence of an **impact** on the environment.
EIA Directive	Directive 85/337/EEC (as amended). The initial Directive of 1985 and its three amendments have been codified by Directive 2011/92/EU of 13 December 2011. Directive 2011/92/EU has been amended in 2014 by Directive 2014/52/EU. The Directive is given effect in UK legislation

Term	Definition
	through the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.
EIA Regulations	The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.
EIA Scoping Opinion	The **Secretary of State's** written opinion as to the scope, and level of detail, of the information to be provided by the Applicant in the **Environmental Statement** for a particular project that is the subject of the Scoping Opinion.
EIA Scoping Report	A report (this report) prepared by an Applicant to provide the information required under the **EIA Regulations** to request a **Scoping Opinion** from the **Secretary of State**.
Embedded Mitigation	Actions that would occur with or without input from the **EIA** feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental **effects** (direct and indirect), which is also known as Tertiary Mitigation. This also includes mitigation which is designed into a particular project to avoid, minimise or reduce likely adverse significant effects, which is also known as Primary Mitigation.
Emission	A material that is expelled or released to the environment. Usually applied to gaseous or odorous discharges to the atmosphere.
Energy from Waste	The conversion of waste into a useable form of energy, often electricity and/or heat.
Enhancement	Measures to improve the environment, such as Biodiversity Net Gain.
Environmental Assessment Level (EAL)	A term used by the Environment Agency to judge the acceptability of proposed **emissions** to air from industrial sites, and their relative contribution to the environment. EALs represent a pollutant concentration in ambient air at which no significant **risks** to human health are expected.
Environmental Impact Assessment (EIA)	A systematic means of assessing the significance of effects of the **Proposed Scheme**, undertaken in accordance with the **EIA Regulations**.
Environmental Mitigation Opportunity Areas	The additional areas outside of the Site being explored for enhancement and mitigation (as shown in **Figure 7-7:**

Term	Definition
	Environmental Mitigation Opportunity Areas (Volume 2)).
Environmental Statement (ES)	A statement prepared in accordance with the **EIA Regulations** that includes the information that is reasonably required to assess the likely effects of a development and which the applicant can, having regard in particular to current knowledge and methods of assessment, reasonably be required to compile but that includes at least the information required in the **EIA Regulations** and which is prepared in accordance with the latest **EIA Scoping Opinion** adopted by the **Secretary of State** (where relevant).
Flood Map for Planning	A map maintained by the Environment Agency that defines **Flood Zones** based on annual probability of flooding from fluvial and tidal sources to inform development planning and flood risk assessments. Nationally consistent delineation of 'high', 'medium' and 'low' flood risk updated by the Environment Agency as deemed appropriate, typically on a quarterly basis.
Flood Risk Assessment (FRA)	An assessment of the risk of flooding.
Flood Zone 1	Comprises land assessed as having less than a 1 in 1,000 (0.1%) annual probability of flooding from rivers or the sea in any year.
Flood Zone 2	Comprises land assessed as having between a 1 in 100 (1%) and 1 in 1,000 (0.1%) annual probability of flooding from rivers, or between a 1 in 200 (0.5%) and 1 in 1,000 (0.1%) annual probability of flooding from the sea in any year.
Flood Zone 3a	Comprises land assessed as having a 1 in 100 (1%) or greater annual probability of flooding from rivers or a 1 in 200 (0.5%) or greater annual probability of flooding from the sea in any year.
Flood Zone 3b (Functional Floodplain)	Comprises land where water has to flow or be stored in times of flood.
Flood Zones	Zones based on the annual probability of flooding from fluvial and tidal sources, as defined in the **Flood Map for Planning**. Areas are categorised into one of the following: **Flood Zone 1, Flood Zone 2, Flood Zone 3a** or **Flood Zone 3b**.

Term	Definition
Future Baseline	The likely evolution of the **Baseline** without implementation of the **Proposed Scheme**.
Geographical Information System (GIS)	A system that captures, stores, analyses, manages, and presents data linked to location. It links spatial information to a digital database.
Greenhouse Gas (GHG)	Gas that absorbs and emits reflected solar radiation, resulting in the warming of the Earth's atmosphere. It is absorbed and emitted at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. The six main GHG emissions that are caused by human activity are: carbon dioxide (CO_2), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbon, and sulphur hexafluoride. In combination, these GHG emissions are commonly expressed in terms of 'carbon dioxide equivalents' (CO_2e) according to their relative global warming potential.
Gross Value Added (GVA)	Estimates of regional GVA, which is the value generated by any unit engaged in the production of goods and services.
Groundwater Source Protection Zone (SPZ)	The Environment Agency has designated SPZ for 2,000 groundwater supply sources. The SPZ are designed to control activities close to water supplies intended for human consumption. These water sources include wells, boreholes and springs, all of which are used for public drinking. Contamination of these zones from any activity might cause pollution in the area and pose a risk to the public who consume tap water. The closer the activity is to the water source, the greater the risk.
Habitat	The environment in which populations or individual species live or grow.
Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna, which are implemented in UK legislation via the Conservation of Habitats and Species Regulations 2017.
Habitats of Principal Importance (HPI)	Semi-natural habitat types identified as being the most threatened and requiring conservation action under the **UK Biodiversity Action Plan (UKBAP)**.

Term	Definition
Habitats Regulations	The Conservation of Habitats and Species Regulations 2017 (as amended) which cover the terrestrial environment and implement the **Habitats Directive**.
Habitats Regulations Assessment (HRA)	A Habitats Regulations Assessment (HRA) refers to the stages of assessment carried out by the Secretary of State in accordance with **Habitats Regulations** and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) to determine if a project may affect the protected features of a **National Network Site** before deciding whether to undertake, permit or authorise it. A report is prepared by the Applicant to inform the assessment carried out by the Secretary of State.
Heritage	The historic environment and especially valued assets and qualities, such as historic buildings and cultural traditions.
Heritage Asset	A building, monument, site, place, area, or landscape identified as having a degree of significance because of their historic, archaeological, architectural or artistic interest which meriting consideration in planning decisions. Heritage Assets include **designated heritage assets** and **non-designated heritage assets**. A building, monument, site, place, area, or **Landscape** identified as having a degree of significance meriting consideration in planning decisions, because of its **Heritage** interest. Heritage Assets include **designated heritage assets** and **non-designated heritage assets**.
Hydrology	The movement, distribution, and quality of water throughout the earth.
Hydromorphology	The physical characteristics of the shape, boundaries, and content of a water body.
Impact	A physical or measurable change to the environment attributable to the **Proposed Scheme**.
Important Ecological Features	Those ecological features (habitats, species, ecosystem and their functions/processes) that are important and should be subject to detailed assessment. Such ecological features will be those that are considered to be important and potentially affected by the **Proposed Scheme**.

Term	Definition
Index of Multiple Deprivation	The most widely used data set for relative deprivation in local authorities across England.
Indirect Employment	Employment growth arising through manufacturing services and suppliers to the construction process (indirect or supply linkage multipliers) for a project.
Induced Employment	Employment associated with expenditure as a result of those who derive incomes from the direct and supply linkage impacts of the **Proposed Scheme**.
LAeq	The equivalent continuous sound level. When a noise varies over time, the Laeq is the equivalent continuous sound which would contain the same sound energy as the time varying sound. Measured in decibels (dB).
Laeq, T	A type of average used to describe a fluctuating noise in terms of a single noise level over the sample period (T). Measured in dB.
Laeq,16h	The annual average noise level (in dB) for the 16-hour period between 0700-2300.
Lamax	The maximum A-weighted sound pressure level recorded over the period stated. Lamax is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall **Laeq,T** noise level, but will still affect the noise environment.
Land Use	What land is used for based on broad categories of functional land cover, such as urban and infrastructure use and the different types of agricultural and forestry.
Landform	The shape and form of the land surface which has resulted from combinations of geology, geomorphology, slope, elevation, and physical processes.
Landscape	An area, as perceived by people, the character of which is a result of the action and interaction of natural and/or human factors.
Lead Local Flood Authority (LLFA)	Local authority responsible to taking the lead on local flood risk management as defined within the Flood and Water Management Act 2010.

Term	Definition
Likely Significant Effect (LSE)	The significance of an environmental effect is typically a function of the 'value' or 'sensitivity' of the receptor and the 'magnitude' or 'scale' of the impact. Combining the environmental value of the resource or receptor with the magnitude of change produces a significance of effect category. The definition of a significant effect for each technical environmental topic will be contained within its respective chapter of the **Environmental Statement**.
Lnight	The night-time annual average noise (in dB) where night is defined as 2300-0700.
Local Development Plan (LDP)	The set of documents and plans that present the local planning authority's policies and proposals for the development and use of land in its area.
Local Nature Reserve (LNR)	A site of importance for wildlife, geology, education, or public enjoyment.
Local Planning Authority (LPA)	The local authority or council that is empowered by law to exercise statutory town planning functions for a particular area of the UK.
Local Wildlife Site (LWS)	Non-statutory designated site with substantive nature conservation value.
London LOOP	The London Outer Orbital Path, or LOOP, almost completely encircles Greater London. Nearly 150 miles are split into 24 sections between Erith station and Purfleet.
Lowest Observed Adverse Effect Level (LOAEL)	The level above which adverse effects on health and quality life can be detected as a result of noise and vibration.
Made Ground	Area where material is known to have been placed by people on the pre-existing (natural or artificial) land surface (including engineered fill).
Magnitude	A combination of the scale, extent, and duration of an **impact**.

Term	Definition
Main River	A watercourse shown as such on the **Flood Map for Planning** and can include any structure or appliance for controlling or regulating the flow of water in, into or out of a main river. Main Rivers are usually larger streams and rivers, but also include smaller watercourses of strategic drainage importance. Main Rivers are under the jurisdiction of the Environment Agency which has powers to carry out flood defence works to Main Rivers.
Major Accident	In the context of the **Proposed Scheme**, an event that threatens immediate or delayed serious damage to human health, welfare and/or the environment and requires the use of resources beyond those of the **Applicant** or its contractors. Serious damage includes the loss of life or permanent injury and / or permanent or long-lasting damage to an environmental **Receptor** that cannot be restored through minor clean-up and restoration efforts.
Middleton Jetty	The jetty currently operated to transfer residual waste and ash to and from the **Riverside Campus**.
Mitigation Area	The mitigation area within the Site Boundary provisionally identified as part of the ongoing **Biodiversity Net Gain (BNG)** Assessment and **EIA** process to provide habitat mitigation, compensation and enhancement (including potential planting for landscaping). See **Section 2.2** of **Chapter 2: Site and Proposed Scheme Description (Volume 1)** for further details.
Mitigation Measures	Actions proposed to prevent, reduce, and where possible offset, significant adverse effects arising from the whole or specific elements of the **Proposed Scheme**.
National Nature Reserve (NNR)	Area of land designated by Natural England as key places for wildlife and natural features in England.
National Network Site	Area of land subject to protection through the **Habitats Regulations**, including **Special Areas of Conservation** (SAC) and **Special Protection Areas** (SPA).
National Planning Policy Framework (NPPF)	The document that sets out Government's planning policies for England and how these are expected to be applied by developers and decision makers. The NPPF was last revised in September 2023.
National Planning Practice Guidance (NPPG)	Explains the processes and tools that can be used through the planning system in England.

Term	Definition
National Policy Statement (NPS)	Overarching policy designated under the **PA2008** (as amended) concerning the planning and consenting of **Nationally Significant Infrastructure Projects** (NSIPs) in the UK.
Nationally Designated Site	Areas of land subject to protection under UK legislation, including **Sites of Special Scientific Interest (SSSI)** and **National Nature Reserves (NNR)**.
Nationally Significant Infrastructure Project (NSIP)	Projects which fall under one of the categories in Part 3 of the **PA2008** (as amended) and therefore require authorisation by way of a **DCO**.
No Observed Effect Level (NOEL)	The level below which no effect from noise or vibration can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
Noise Sensitive Receptors	Any identified **receptor** likely to be affected adversely by noise. These are generally human **receptors**, and may include residential dwellings, workplaces, schools, hospitals, community facilities, places of worship, recreational spaces, and ecological **receptors**.
Non-Designated Heritage Assets	Buildings, monuments, sites, places, areas or landscapes identified as having a degree of significance meriting consideration in planning decisions because of their heritage interest, but which do not meet the criteria for **designated heritage assets**. These can include those identified by a local planning authority such as 'local interest' buildings.
Non-Statutory Consultation	Consultation with stakeholders on the **Proposed Scheme** which occurs in addition to the **Statutory Consultation** required under the PA2008 and **EIA Regulations**.
Non-Statutory Consultees	Consultees who, whilst not designated in law, are likely to have an interest in a proposed development and should therefore be consulted on the **Proposed Scheme**.
Operation Phase	The stage that occurs after the **Proposed Scheme** is handed over by the relevant construction contractor(s), commissioned and approved for operation. It is anticipated that the operation phase is likely to commence in 2029. During the operation phase maintenance will be undertaken. The **Proposed Scheme** will remain in its operation phase until it is decommissioned.

Term	Definition
Ordinary Watercourse	Any river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows that does not form part of a **Main River**. The **LLFA** has powers for Ordinary Watercourses that are similar to those held by the Environment Agency for **Main Rivers**.
Outline Code of Construction Practice (OCoCP)	Document setting out methods to avoid, minimise and mitigate impact on the environment and surrounding area and the protocols to be followed in implementing these measures in accordance with environmental commitments during the **construction phase**. A detailed CoCP will be prepared prior to the commencement of construction, and this will be secured through a requirement in the DCO.
Outline Drainage Strategy	A document setting out the drainage system for managing the surface water within the Site. A detailed drainage strategy will be prepared prior to the commencement of construction, and this will be secured through a requirement in the DCO.
Outline Lighting Strategy	Document setting out the lighting infrastructure within the Site, including lighting columns and security lighting. A detailed lighting strategy will be prepared prior to the commencement of construction, and this will be secured through a requirement in the DCO.
Operational Environmental Management Plan (OEMP)	An OEMP is a document that outlines the approach to managing and minimising the environmental impacts resulting from the Proposed Scheme's operations. The document will be prepared prior to the **Proposed Scheme** commencing operation and this will be secured through a requirement in the DCO.
Outline Landscape and Environmental Management Plan (OLEMP)	A strategy that sets out an approach to mitigate the effects of the Proposed Scheme on townscape and biodiversity. A final strategy will be prepared prior to the commencement of construction, and this will be secured through a requirement in the DCO.
Phase 1 Habitat Survey	An ecological survey technique that provides a standardised system to record vegetation and wildlife **habitats**. It enables a basic assessment of **habitat** type and its potential importance for nature conservation.

Term	Definition
Planning Act 2008 (PA2008)	The Act (as amended) provides the primary legislative basis for the consenting regime for granting planning and other consents for **Nationally Significant Infrastructure Projects and Projects of National Significance**.
Planning Inspectorate (PINS)	The Government agency responsible for administering applications for development consent under the **PA2008** (as amended) on behalf of the relevant **Secretary of State**.
Preliminary Ecological Appraisal (PEA)	Preliminary ecological surveys have a range of purposes; one key use is to gather data on existing conditions, often with the intention of conducting a preliminary assessment of likely impacts of proposed developments or establishing the baseline for future monitoring. As a precursor to a proposed project, some evaluation is usually made within these appraisals of the ecological features present, as well as scoping for notable **species** or **habitats**, identification of potential constraints to the **Proposed Scheme** and recommendations for **mitigation measures**.
Preliminary Environmental Information Report (PEIR)	This Report, comprising environmental information which has been compiled by **the Applicant** and is reasonably required for the bodies consulted at statutory consultation to develop an informed view of the **likely significant effects** of the **Proposed Scheme** (and of any associated development).
Principal Aquifer	These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, Principal Aquifers are aquifers previously designated as major aquifers.
Priority Habitat Inventory	A spatial dataset that describes the geographic extent and location of **Habitats of Principal Importance (HPI)** as defined in section 41 of the Natural Environment and Rural Communities Act (2006) Section 41 **Habitats of Principal Importance (HPI)**.
Project of National Significance	Development directed into the **PA2008** regime by a section 35 Direction by the Secretary of State.
Proposed Jetty	A new and dedicated export structure within the River Thames is required to export the **CO_2** captured as part of the **Carbon Capture Facility.**

Term	Definition
Proposed Scheme	The scheme for which a **DCO** will be sought, comprising the Carbon Capture Facility, the Proposed Jetty, the Temporary Construction Compounds and the Mitigation Area, and Ancillary Infrastructure related to those activities. See **Chapter 2: Site and Proposed Scheme Description (Volume 1)** for further details.
Public Right of Way (PRoW)	A right by which the public can pass along linear routes over land (which may be privately owned) at all times. The mode of transport may be restricted (i.e., foot, horse back/pedal cycle, non-motorised vehicle, or be open to all vehicles).
Ramsar Site	Wetlands of international importance, designated under the Ramsar Convention 1971.
Receptor	A component of the natural, created or built environment such as a human being, water, air, a building, habitat or plant that has the potential to be affected by the **Proposed Scheme**.
Register of Commitments	Summarises the committed impact avoidance, mitigation and enhancement measures within the chapters of the **Environmental Statement**, and associated appendices, that are to be adopted in relation to the **Proposed Scheme** and its potential identified impacts.
Residual Effects	Effects arising from the **Proposed Scheme** that cannot be mitigated following the implementation of embedded and additional **mitigation measures**.
Risk	The likelihood of an impact occurring, combined with the effect or consequence(s) of the impact on a receptor if it does occur.
Riverside 1	Riverside 1, an energy from waste (EfW) facility generating up to 80.5 megawatt (MW) of electricity. Riverside 1 has been operational since 2011. Riverside 1 is owned and operated by the **Applicant**.
Riverside 2	Riverside 2, an EfW facility with a generating capacity of approximately 76MW, consented by the Riverside Energy Park Order 2020 (as amended). Riverside 2 is currently under construction and anticipated to be operational by 2026. Riverside 2 is owned and will be operated by the **Applicant**.

Term	Definition
Riverside Campus	Riverside Campus is the term used to describe **Riverside 1** and **Riverside 2** and the **Proposed Scheme** collectively.
Safeguarded Wharf	Safeguarded wharves are those wharves in London which have been given special status by the Mayor of London and the Port of London Authority (PLA) which ensures they are retained as working wharves and are protected from redevelopment into non-port use. The Middleton Jetty is designated as a safeguarded wharf. The Belvedere Power Station Jetty (disused) is not a safeguarded wharf.
Scoping	An exercise undertaken pursuant to the **EIA Regulations**, to determine the scope of the technical environmental topics to be addressed assessed within the **ES**.
Secondary Aquifer	These include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary Aquifers are subdivided into two types: **Secondary A** and **Secondary B**. The term **Secondary Undifferentiated** is also used in cases where it has not been possible to attribute either category.
Secondary A Aquifer	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.
Secondary B Aquifer	Predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons, and weathering. These are generally the water-bearing parts of the former non-aquifers.
Secondary Undifferentiated Aquifer	Where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.
Secretary of State (SoS)	In case of the **Proposed Scheme**, the relevant Secretary of State is the SoS for Energy Security and Net Zero.

Term	Definition
Setting	Setting is as defined in the **NPPF** and forms the surroundings in which a heritage asset is experienced. Components of a setting can make positive or negative contribution to the significance of an asset and affect the ways in which it is experienced. Good Practice Advice in Planning Note 3[2] and the **NPPF** state that setting is not fixed and that it may change as the asset and its surrounding evolve. Setting can be extensive and can overlap with the setting of other heritage assets, particularly in urban areas or historic landscapes. While not limited to views, the contribution of setting to the significance of an asset is often expressed in this way, and paragraph 11 of GPA3 identifies those views that contribute to understanding the significance of assets, such as designed views those that were designed or where there are associations with other heritage assets.
Significance	A measure of the importance or gravity of the effect defined by significance criteria specific to the technical environmental topic.
Significant Observed Adverse Effect Level (SOAEL)	The level above which significant adverse effects on health and quality life occur as a result of noise or vibration (see also **significance**).
Site	The area within which the Proposed Scheme will be brought forward, bounded by the Site Boundary.
Site Boundary	The outer perimeter of the **Site**, as shown on **Figure 1-1: Site Boundary Location Plan (Volume 2).**
Site of Importance for Nature Conservation (SINC)	Identified in local planning policy as areas supporting both locally and nationally threatened **habitats** and **species** that are priorities under the county or UK Biodiversity Action Plan (UKBAP).
Site of Special Scientific Interest (SSSI)	A site statutorily notified under the Wildlife and Countryside Act 1981 (as amended) as being of special nature conservation or geological interest. SSSI include **habitats**, geological features, and **landforms**.
Source Protection Zone 1 (SPZ 1)	Also referred to as the 'inner zone'. In relation to contamination risks to groundwater sources, defined by the Environment Agency as the 50-day travel time from any point below the water table to the source. This zone has a minimum radius of 50m and is the most protected of the SPZ categories.

Term	Definition
Special Area of Conservation (SAC)	Area of protected habitats and species as defined in the **Habitats Directive**.
Special Protection Area (SPA)	Site classified in accordance with Article 4 of the EC Birds Directive (79/409/EEC) which came into force in April 1979 and is currently applied in UK legislation by the Conservation of Habitats and Species Regulations 2017 (as amended). Classification is made for rare and vulnerable birds (as listed on Annex 1 of the Directive), and for regularly occurring migratory **species**.
Species	A group of interbreeding organisms that seldom or never interbreed with individuals in other such groups, under natural conditions; most species are made up of subspecies or populations.
Statutory Consultees	The **PA2008** and **EIA Regulations** prescribe circumstances where the **Secretary of State** is required to consult specified bodies prior to a decision being made on a DCO application. It includes bodies such as: Environment Agency, Highways Authority, Historic England, Natural England, and Parish Councils, among others.
Strategic Industrial Location (SIL)	London's main reservoirs of industrial and related capacity. SIL are located close to strategic transport infrastructure such as roads, rail, rivers, canals and safeguarded wharves.
Study Area	The area, defined for each technical topic, within which the **effect(s)** of the **Proposed Scheme** is assessed, which includes areas beyond the **Site Boundary**.
Supporting Plant	A key element of the Carbon Capture Facility, this is the infrastructure required to support the operation of the Carbon Capture Plants which includes a cooling system, flue gas supply ductwork, steam extraction and steam processing, back pressure turbines and generators, chemical storage and distribution handling facilitates, solvent storage, a water treatment plant (process water supply), wastewater treatment plant. Further information is provided in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.
Temporary Construction Compound	A secure area from which site work is managed and resourced, including but not limited to temporary offices, workshop, parking, and storage.

Term	Definition
Thames Water Access Road	The access road is situated within the Carbon Capture Facility zone and is located between the Borax North and Borax South land parcels. The access road connects Norman Road to the Crossness Sewage Treatment Works site.
Thames Water Jetty	To the north of the Crossness Sewage Treatment Works is the Thames Water Jetty.
Townscape	The character and composition of the built environment including the buildings and the relationships between them, the different types of open urban space, including green spaces, and the relationship between buildings and open spaces.
Townscape and Visual Impact Assessment (TVIA)	A tool used to identify and assess the likely significant effect of change resulting from development both on the Townscape as an environmental resource in its own right and on people's views and **visual amenity**.
Townscape Character	A distinct, recognisable and consistent pattern of elements in the **townscape** that makes one townscape different from another.
UK Biodiversity Action Plan (UKBAP)	A national biodiversity action plan, published by the Joint Nature Conservation Committee which describes the biological resources of the UK and provides detailed plans for the conservation of these resources.
Visual Amenity	Overall enjoyment of a particular area, surroundings, or views in terms of peoples' activities - living, recreating, travelling through, visiting, or working.
Visual Effect	An effect on specific views and on the general visual amenity experienced by people.
Visual Receptor	Individuals and/or defined groups of people who have the potential to be affected by the **Proposed Scheme**.
Waste Hierarchy	A ranking system used for the different waste management options according to which is the best for the environment. The most preferred option is to prevent waste, and the least preferred is disposal landfill. It sets out the priorities that must be applied when managing waste.
Waterbody	A discrete body of water forming a physical feature.

Term	Definition
Zero Liquid Discharge (ZLD)	Defined broadly as a process for maximum recovery of water from a waste water source that would otherwise be discharged.
Zone of Influence (ZOI)	The areas/resources that may be affected by the biophysical changes caused by activities associated with a project. ZOI is a term used to represent a technical topic's Study Area based on industry guidance. These include the CIEEM guidance[3], which has been used in **Chapter 7: Terrestrial Biodiversity (Volume 1)** and **Chapter 8: Marine Biodiversity (Volume 1**) and the Planning Inspectorate Note 17[4] which has been used in **Chapter 21: Cumulative Effects (Volume 1)**.
Zone of Theoretical Visibility (ZTV)	A map, digitally produced, showing areas of land within which, the Proposed Scheme is theoretically visible.

ABBREVIATIONS

Acronym	Definition
AADF	Average Annual Daily Flow
AAWT	Annual Average Weekday Traffic
ACM	Asbestos Containing Materials
AD	Anno Domini
ADMS-Roads	Atmospheric Dispersion Modelling System-Roads
AIA	Arboricultural Impact Assessment
AIL	Abnormal Indivisible Loads
AIS	Automatic Identification System
ALARP	As Low as Reasonably Practicable
AOD	Above Ordnance Datum
APA	Archaeological Priority Area
APE	Annual Probability of Exceedance
APIS	Air Pollution Information Service
AQAP	Air Quality Action Plan
AQFA	Air Quality Focus Area
AQMA	Air Quality Management Area
AQNA	Air Quality Neutral Assessment
AQPS	Air Quality Positive Statement
AQS	Air Quality Strategy; relevant to England, Scotland, Wales and Northern Ireland
ASCOBANS	Agreement on the Conservation of Small Cetaceans in the Baltic, North-East Atlantic, Irish and North Seas
ASHP	Air Source Heat Pump
ATC	Automatic Traffic Count
BAP	Biodiversity Action Plan
BAT	Best available technology
BES	Building Research Establishment Environmental Sustainability Standard
BESS	Battery Energy Storage System
BGS	British Geological Survey
BNG	Biodiversity Net Gain

Acronym	Definition
BOG	Boil-off Gas
BoQ	Bill of Quantities
BPM	Best Practicable Means
BRE	British Research Establishment
BS	British Standard
BTO	British Trust for Ornithology
C&I	Commercial and Industrial Waste
CAPEX	Capital Expenditure
CBRN	Chemical, Biological, Radiological and Nuclear
CCI	Community Conservation Index
CCRA	Climate Change Risk Assessment
CCS	Carbon Capture and Storage
CCTV	Closed Circuit Television
CD	Chart Datum
CD	Consultation Distance (**(Chapter 20: Major Accidents and Disasters (Volume 1)** only)
CDE	Construction, Demolition and Excavation
CDM	Construction Design and Management
CE	Common Era
CEA	Cumulative Effects Assessment
CEMP	Construction Environmental Management Plan
CEMS	Continuous Emissions Monitoring System
CERC	Cambridge Environmental Research Consultants
CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists
CIRIA	Construction Industry Research and Information Association
CL:AIRE	Contaminated Land: Applications in Real Environments
CLP	Construction Logistics Plan
CO_2	Carbon Dioxide
COCP	Code of Construction Practise
COMAH	Control of Major Accident Hazards

Acronym	Definition
CoP	Code of Practice
COSHH	Control of Substances Hazardous to Human Health
CRI	Climate Risk Indicator
CRoW	Countryside and Rights of Way Act 2000
CRTN	Calculation of Road Traffic Noise
CSM	Conceptual Site Model
CTMP	Construction Traffic Management Plan
CWTP	Construction Worker Workforce Travel Plan
DAD	Design Approach Document
dB	Decibel
DBC	Dartford Borough Council
DCO	Development Consent Order
DEFRA	Department for Environment, Food & Rural Affairs
DF2	Design Freeze 2
DfT	Department for Transport
DLUHC	Department for Levelling Up, Housing and Communities
DMA	Dimethylamine
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
DoS	Degree of Saturation
DSEAR	The Dangerous Substances and Explosives Atmospheres Regulations 2002
DTM	Digital Terrain Model
EA	Environment Agency
EAL	Environmental Assessment Levels
EC	European Commission
EcIA	Ecological Impact Assessment
EEA	European Economic Area
EHS	Environmental, Health, and Safety
EIA	Environmental Impact Assessment
ELC	European Landscape Convention

Acronym	Definition
EoL	End of Life
EPA	Environmental Protection Act 1990
EPR	Environmental Permitting (England and Wales) Regulations 2016Environmental Permitting Regulations
EPUK	Environmental Protection UK
EQS	Environmental Quality Standards
ES	Environmental Statement
FCTMP	Framework Construction Traffic Management Plan
FFL	Finished Floor Level
FRA	Flood Risk Assessment
FSA	Formal Safety Assessment
FTE	Full-time Equivalent
FW	Freshwater
GHG	Greenhouse Gas
GiGL	Greenspace Information for Greater London
GIIP	Good International Industry Practice
GLA	Greater London Authority
GLAAS	Greater London Archaeology Advisory Service
GLHER	Greater London Historic Environment Record
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, Third Edition
GNSS	Global Navigation Satellite System
GPP	Guidance for Pollution Prevention
GPS	Global Positioning System
GVA	Gross Value Added
GWDTE	Groundwater Dependent Terrestrial Ecosystem
H&S	Health and Safety
HAT	High Astronomical Tide
HAZID	Hazard Identification Study
HCl	Hydrogen Chloride
HEDBA	Historic Environment Desk-Based Assessment
HF	Hydrogen Fluoride

Acronym	Definition
HGVs	Heavy Goods Vehicles
HPA	Health Protection Agency
HPI	Habitats of Principal Importance
HSE	Health & Safety Executive
HSS	Heat Stable Salts
IALA	International Association of Lighthouse Authorities
IAQM	Institute of Air Quality Management
IBA	Incinerator Bottom Ash
ICE	Inventory of Carbon and Energy
IED	Industrial Emissions Directive
IEMA	Institute of Environmental Management and Assessment
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
KCC	Kent County Council
LAQM	Local Air Quality Management
LAT	Lowest Astronomical Tide
LBAP	Local Biodiversity Action Plan
LBB	London Borough of Bexley
LBH	London Borough of Havering
LCA	Landscape Character Area
LCO_2	Liquid Caron Dioxide
LCRM	Land Contamination Risk Management
LFEPA	London Fire and Emergency Planning Authority
LHA	Local Highway Authority
LiDAR	Light Detection and Ranging
LLAQM.TG(19)	London Local Air Quality Management Technical Guidance
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve

Acronym	Definition
LOAEL	Lowest Observed Adverse Effect Levels
LSE	Likely Significant Effects
LSOA	Lower Super Output Area
LTP	Local Transport Plan
LULUCF	Land Use, Land Use Change and Forestry
LVMF	London View Management Framework
LWS	Local Wildlife Sites
MA&D	Major Accidents and Disasters
MAGIC	Multi-Agency Geographic Information System Mapping
MAHP	Major Accident Hazard Pipelines
MCA	Maritime and Coastguard Agency
MCC	Manual Classified Counts
MCZ	Marine Conservation Zone
MBES	Multi beam echo sounder
MEA	Monoethanolamine
MGN	Marine Guidance Notes
MHCLG	Ministry of Housing, Communities & Local Government
MHW	Mean High Water
Mm^2	Million Square Meters
Mm^3	Million Cubic Meters
MMP	Materials Management Plan
MOL	Metropolitan Open Land
MOPAC	Mayor's Office for Policing and Crime
MP	Members of Parliament
MP	Measurement Position
MSOA	Middle Layer Super Output Area
Mt	Million Tonnes
MW	Megawatt
MWe	Megawatt electrical
MWH	Mean High Water
NCA	National Character Area

Acronym	Definition
NDC	Nationally Determined Contribution
NDMA	Nitrosodimethylamine
NERC	The Natural Environment and Rural Communities Act 2006
NGR	National Grid Reference
NH	National Highways
NH_3	Ammonia
NHLE	National Heritage List for England
NM	Nautical Miles
NMBAQC	Marine Biological Analytical Quality Control
NMHR	National Marine Heritage Record
NNSS	Non-native Species Secretariat
NOMIS	Official Census and Labour Market Statistics
NO_x	Oxides of Nitrogen
NPPF	National Planning Policy Framework
NPS EN-1 (2011)	Overarching National Policy Statement for Energy (2011)
NPS EN-1 (2023)	Draft Overarching National Policy Statement for Energy (2023)
NPSE	Noise Policy Statement for England (2010)
NRMM	Non-Road Mobile Machinery
NSIP	Nationally Significant Infrastructure Project
NSR	Noise Sensitive Receptor
NTM	National Transport Model (2020)
OA	Opportunity Areas
OCoCP	Outline Code of Construction Practice
OD	Ordnance Datum
OEPRP	Outline Emergency Preparedness and Response Plan
OPEX	Operational Expenditure
OS	Ordnance Survey
OSPAR Convention	The Convention for the Protection of the Marine Environment in the North-East Atlantic 1992
PAH	Polyaromatic Hydrocarbon

Acronym	Definition
PAS	Publicly Available Specification
PBDEs	Polybrominated Diphenyl Ethers
PBRA	Preliminary Bat Roost Assessment
PCBs	Polychlorinated Biphenyls
PEA	Preliminary Ecological Appraisal
PEIR	Preliminary Environmental Information Report
PEM	Polymer Electrolyte Membrane
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substance
PFOS	Perfluorooctane Sulfonate
PIC	Personal Injury Collision
PLA	Port of London Authority
PM	Particulate Matter
PM_{10}	Particulate Matter ($_{10}$)
$PM_{2.5}$	Particulate Matter ($_{2.5}$)
PNS	Projects of National Significance
PPE	Personal Protective Equipment
PPG	Pollution Prevention Guidelines
PPT	Parts per Thousand
PRoW	Public Right of Way
PSA	Particle Size Analysis
PSYM	Pond Predictive System for Multimetrics
PSZ	Public Safety Zones
PYSM	Pond Predictive System for Multimetrics
RBD	River Basin District
RBG	Royal Borough of Greenwich
RBMP	River Basin Management Plan
RCP	Representative Concentration Pathway
REAC	Register of Environmental Actions and Commitments
RFC	Ratio of Flow to Capacity
RFI	Request for Information
ROG	Recommended Operational Guidelines

Acronym	Definition
RoRo	Roll on-Roll off
RPA	Root Protection Area
SAC	Special Area of Conservation
SCI	Sites of Community Importance
SFRA	Strategic Flood Risk Assessment
SINC	Site of Importance for Nature Conservation
SLR	Sea Level Rise
SOAEL	Significant Observed Adverse Effect Levels
SoCC	Statement of Community Consultation
SoS	Secretary of State
SO_2	Sulphur Dioxide
SPA	Special Protection Area
SPG	Supplementary Planning Guidance
SPI	Species of Principal Importance
SPZ	Source Protection Zone
SRN	Strategic Road Network
SSS	Side scan sonar
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
SVOC	Semi-Volatile Organic Compounds
SWMP	Site Waste Management Plan
T	Time
TA	Transport Assessment
TCPA	Town and Country Planning Act 1990 (as amended)
TEMPro	Trip End Model Presentation Program
TFI	Task Force on National Greenhouse Gas Inventories
TfL	Transport for London
TLRN	Transport for London Road Network
TPH	Total Petroleum Hydrocarbons
TPO	Tree Preservation Order
TraC	Transitional and Coastal

Acronym	Definition
TVIA	Townscape and Visual Impact Assessment
TWUL	Thames Water Utilities Limited
UKBAP	UK Biodiversity Action Plan
UKC	Underkeel Clearance
UKCP21	UK Climate Projections 2021
UKHO	United Kingdom Hydrographic Office
UKHSA	UK Health Security Agency
UPS	Uninterruptible Power Supply
UTRCA	Upper Thames River Conservation Authority
VHF	Very High Frequency
VOC	Volatile Organic Compound
VP	Viewpoint
WCA	The Wildlife and Countryside Act 1981 (as amended)
WFD	Water Framework Directive
WHO	World Health Organisation
WID	Water Injected Dredging
WIMS	Water Information Management System
WPP	Water Preferred Policy
WRZ	Water Resource Zone
WTP	Workplace Travel Plan
ZOI	Zone of Influence
ZSL	Zoological Society of London
ZTV	Zone of Theoretical Visibility
ZVI	Zone of Visual Influence
AAWT	Annual Average Weekday Traffic

DECARBONISATION

CHAPTER 1: INTRODUCTION

Cory Decarbonisation Project

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TABLE

1. INTRODUCTION

1.1. BACKGROUND

1.1.1. Cory Environmental Holdings Limited (hereafter referred to as 'Cory') is part of the Cory Group, one of the UK's leading resource management companies, with an extensive river logistics network in London underpinned by a long history and deep connection to the city stretching back to the late 1700s.

1.1.2. Cory has invested heavily in London's waste recycling, energy generation and river logistics infrastructure. In addition to its commercial customers, Cory is a trusted partner for several local authorities in London (serving a combined population of approximately 3 million people). It operates essential infrastructure which London relies heavily upon on a day-to-day basis.

1.1.3. Its core activity, recovering energy from residual waste, is undertaken at their Riverside Campus, located adjacent to the River Thames at Belvedere in the London Borough of Bexley (LBB). Riverside 1 is an existing energy from waste (EfW) facility generating up to 80.5 megawatt (MW) of electricity, has been operational since 2011[a]. Riverside 2, an EfW facility with a generating capacity of approximately 76MW, is currently under construction and anticipated to be operational in 2026.

1.1.4. Riverside 1 and Riverside 2 will provide over 1.5 million tonnes per annum (tpa) of residual waste management capacity, making a substantial contribution to addressing the waste needs of London and Southeast England.

1.1.5. Cory (hereafter referred to as the Applicant) intends to construct and operate the Proposed Scheme to be linked with the River Thames. It comprises of four key zones which are described below, further detail is provided within **Chapter 2: Site and Proposed Scheme Description**:

- The Carbon Capture Facility: the construction of infrastructure to capture a minimum of 95% of carbon dioxide (CO_2) emissions from Riverside 1 and 95% of CO_2 emissions from Riverside 2 once operational, which is equivalent to approximately 1.3Mt CO_2 per year[5]. The capture rate is the annual average. The Carbon Capture Facility will be one of the largest carbon capture projects in the UK;
- The Proposed Jetty: A new and dedicated export structure within the River Thames is required to export the CO_2 captured as part of the Carbon Capture Facility;

[a] Pursuant to a Section 36C Variation issued by the Secretary of State on 17 December 2021, this capacity has now been increased to 80.5MW.

- The Mitigation Area: Land provisionally identified as part of the ongoing Biodiversity Net Gain (BNG) Assessment to provide habitat mitigation, compensation and enhancement (including potential planting for landscaping); and
- The Temporary Construction Compounds: These areas will be used during construction for, including but not limited to, offices, warehouses, workshops, open air storage and car parking. The areas will be reinstated to their original use following completion of the construction works for the Proposed Scheme or utilised as part of the Proposed Scheme.

1.1.6. Together, the Carbon Capture Facility, the Proposed Jetty, the Mitigation Area, the Temporary Construction Compounds, and ancillary and associated developments related to those activities are referred to as the 'Proposed Scheme'. The land upon which the Proposed Scheme is to be located is referred to as the 'Site' and the extent referred to as the 'Site Boundary'.

1.1.7. The Proposed Scheme demonstrates the Applicant's status as leaders within the decarbonisation agenda and the Proposed Scheme is the next stage of the company's ambitions to continue to drive forward innovation.

1.1.8. The Proposed Scheme will form an important element of the proposed Riverside Heat Network; a partnership with Vattenfall designed to deliver heat to homes in the LBB and the Royal Borough of Greenwich, with other opportunities also being explored.

1.1.9. A full description of the Site and the Proposed Scheme is presented in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

1.1.10. The Hydrogen Project and the battery energy storage system, as identified in the Scoping Report[6] are no longer a part of the ongoing Proposed Scheme design as set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**. Neither the Hydrogen Project nor the battery energy storage system will be considered further as part of the Proposed Scheme. The decision to no longer progress the development of the Hydrogen Project and the battery energy storage system was made on commercial grounds, with there being uncertainty around the hydrogen market, local off takers and overall profitability of the Proposed Scheme.

1.1.11. WSP has been commissioned by the Applicant to prepare an Environmental Impact Assessment (EIA) Preliminary Environmental Information Report (PEIR), produced in connection with the formal statutory consultation for the Proposed Scheme.

1.1.12. This PEIR is based on the Site Boundary shown in **Figure 1-1: Site Boundary Location Plan (Volume 2)**. **Figure 1-2: Satellite Imagery of the Site Boundary Plan (Volume 2)** shows the Site Boundary with satellite imagery background. **Figure 1-1: Site Boundary Location Plan (Volume 2)**) is currently considered the maximum extent of all potential permanent and temporary works required in the construction and operation of the Proposed Scheme and is likely to be refined following further environmental assessment and consultation, ahead of submission of the Development Consent Order (DCO) application.

1.1.13. There have been two minor extensions to the Site Boundary since that presented in the Scoping Report[6]. The first, to the east of the Site, to include the Iron Mountain and Asda Access Road which runs adjacent to Norman Road, to facilitate the construction of the Proposed Jetty. The second, at the southern end of Norman Road adjacent to the roundabout connecting the A2016 Picardy Manorway /Eastern Way, which facilitates a connection from the Proposed Scheme into the existing foul sewer network.

1.1.14. The location of the four key zones of the Proposed Scheme within the Site are shown on **Figure 1-3: Indicative Site Layout Plan (Volume 2)**.

1.2. REQUIREMENT FOR DEVELOPMENT CONSENT

1.2.1. By way of letter dated 6th October 2022, the SoS made a Direction, under Section 35(1) of the Planning Act 2008 (PA2008)[7], that the Proposed Scheme should be treated as development for which development consent under the PA2008[7] (as amended) is required and therefore a Project of National Significance (PNS). The SoS was satisfied that[8]:

- "*The Proposed Project is in the field of energy and development and will be wholly within England*;

  The Proposed Project does not currently fall within the existing definition of a "*nationally significant infrastructure project*" and therefore it is appropriate to consider use of the power in section 35(1) of the PA2008[7] and
- *Cory's request constitutes a "qualifying request" in accordance with section 35ZA(11) of the Planning Act 2008*."

1.2.2. In coming to this conclusion, the SoS noted that the "*Proposed Project relates to the construction of post combustion carbon capture, storage, and transfer equipment; and the construction of hydrogen facilities and thus sits within one of qualifying infrastructure fields listed in section 35(2)(a)(i) – energy - of the Planning Act*".

1.2.3. The SoS highlighted that one of the reasons that the Proposed Scheme should be considered as a PNS is that:[8]

"The carbon capture element of the Proposed Project would provide and support the decarbonisation of energy from waste derived CO_2 emissions in the UK, delivering over a million tonnes of CO_2 savings per annum, and supporting the achievement of a fully de-carbonised district heating network that crosses local authority areas".

1.3. DEFINITION OF EIA

1.3.1. The term EIA describes a procedure that must be followed for certain types of developments before they can be granted 'consent'. The procedure is a means of identifying, consulting upon and assessing a development's likely significant environmental effects. This helps to ensure that the importance of the predicted effects and the scope for avoiding, preventing, reducing or, if possible, offsetting them are properly understood by the public and the authority granting consent before it makes its decision.

1.4. REQUIREMENT FOR EIA

1.4.1. As the Proposed Scheme is a PNS (the reasons for which are outlined in **Section 1.2**), the Infrastructure Planning (EIA) Regulations 2017[9] (hereafter referred to as 'the EIA Regulations') are the relevant Regulations to be considered. The Applicant considers that the Proposed Scheme is 'EIA development' for the purposes of those Regulations.

1.4.2. The process and content of EIA is summarised in Regulation 5 of the EIA Regulations[9]. Central to the process is the preparation of an Environmental Statement (ES) and the carrying out of associated procedural steps, including consultation, publicity, and notification.

1.4.3. A Regulation 8 (of the EIA Regulations)[9] letter, along with the EIA Scoping Report, was submitted to the SoS on 18th April 2023. This confirmed that the Applicant intends to submit an application for development consent, which will include an ES, in Q1 2024. The Planning Inspectorate, on behalf of the SoS, adopted a Scoping Opinion on 26th May 2023[10].

1.5. NATIONAL POLICY STATEMENTS

1.5.1. As the recent case of EfW Group Ltd v SSBEIS[11] re-emphasised, developments that are the subject of a Section 35 Direction are not nationally significant infrastructure projects for the purposes of Section 14 of the PA2008[7]. The Section 35 Direction dictates that they are developments for which development consent is required under the PA2008[7]. That case went on to say that National Policy Statements (NPS)[12] (and in particular NPS EN-1 (2011)[13]) must relate to projects that are nationally significant infrastructure projects under Section 14, unless the relevant NPS says otherwise (as it does in the case of the NPS for National Networks[14]).

1.5.2. The consequence of EfW Group Ltd v SSBEIS[11] is that until EN-1 (2023)[12] is adopted Section 104 of the PA2008[7], which requires the SoS to determine applications in accordance with the relevant NPS, does not apply to energy projects that are the subject of a Section 35 Direction (i.e. to PNSs) as they cannot be a "*development of the description*" to which the NPS have effect. As such, at the time of writing, the application for the Proposed Scheme would therefore be dealt with under Section 105 of the PA2008[7], as this application for a DCO is not an application to which Section 104 applies[7]. If the new NPS are designated prior to submission of the DCO application, then Section 104 will apply.

1.5.3. Section 105 of the PA2008[7] requires the SoS to take account of, amongst other things, "*any other matters which the SoS thinks are important and relevant to the SoS's decision*".

1.5.4. It will be the Applicant's case that the existing and emerging NPS EN-1[13] should be important and relevant considerations to the determination of the application for development consent. Both set out the need for new nationally significant infrastructure which includes meeting energy security and carbon reduction strategies, the need for more electricity capacity to support increased supply from renewables and the need to meet future increases in electricity demand.

1.6. PURPOSE OF THE PEIR

1.6.1. As described in the Planning Inspectorate's Advice Note 7[15], the purpose of this PEIR is to provide preliminary environmental information reasonably required to enable members of the public (including local communities), local authorities, statutory bodies, and people whose land or interests would potentially be affected to understand the likely significant environmental effects of the Proposed Scheme. This helps to inform their consultation responses so that they may provide meaningful feedback during the statutory consultation for the Proposed Scheme. The Applicant will have regard to all relevant comments made by consultees during this consultation, prior to the proposals for the Proposed Scheme being finalised.

1.6.2. The PEIR provides information about the Proposed Scheme that reflects the emerging design and allows preliminary assessment of environmental effects to be undertaken for the preliminary understanding of environmental effects to be considered by consultees. Further design information and updates to the environmental assessments will be provided as part of the ES.

1.6.3. The PA2008[7] and the EIA Regulations[9] require the Applicant of a proposed DCO to make preliminary environmental information available during the statutory consultation. Typically, this information takes the form of a PEIR.

1.6.4. Preliminary environmental information is required by the EIA Regulations[9] and defined in Regulation 12(2) as information referred to in Regulation 14(2)[9], which:

> "a) *has been compiled by the Applicant; and*
>
> *b) is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of a development (and of any associated development)*".

1.6.5. Regulation 14(2) and Schedule 4 specify what environmental information must be included within the ES (subject to it being reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects) and which has been used to inform the PEIR. A summary of the information required is given in **Table 1-1** below.

Table 1-1: Information for Inclusion in the ES

Location in EIA Regulations 2017[9]	Requirement	Location in PEIR
Reg 14(2)(a)	*"a description of the proposed development comprising information on the site, design, size and other relevant features of the development"*	**Chapter 2: Site and Proposed Scheme Description (Volume 1)** **Chapter 5: Air Quality** to **Chapter 20: Major Accidents and Disasters (Volume 1)**
Schedule 4(1)(a) to (d)	*"A description of the development, including in particular—* *-a description of the location of the development;* *-a description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;* *-a description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;* *-an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases."*	

Location in EIA Regulations 2017[9]	Requirement	Location in PEIR
Reg 14(2)(b)	*"A description of the likely significant effects of the proposed development on the environment"*	**Chapter 5: Air Quality** to **Chapter 20: Major Accidents and Disasters (Volume 1)**
Schedule 4(4)	*"A description of the factors specified in regulation 5(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape"*	
Reg 14(2)(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"*	**Chapter 5: Air Quality** to **Chapter 20: Major Accidents and Disasters (Volume 1)**
Schedule 4(7)	*"A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced, or*	

Location in EIA Regulations 2017[9]	Requirement	Location in PEIR
	offset, and should cover both the construction and operational phases"	
Reg 14(2)(d)	*"A description of the reasonable alternatives studied by the Applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment"*	**Chapter 3: Consideration of Alternatives (Volume 1)**
Schedule 4(2)	*"A description of the reasonable alternatives (for example in terms of development design, technology, location, size, and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects"*	
Reg 14(2)(e)	*"A non-technical summary of the information referred to in sub-paragraphs (a) to (d)"*	A summary of the significant effects identified in this PEIR is set out within **Chapter 22: Summary of Effects (Volume 1).** A non-technical summary of this PEIR is included in the consultation brochure published alongside this PEIR as part of the statutory consultation for the Proposed Scheme. A separate NTS will be prepared as part of the ES in the application for development consent.
Schedule 4(9)	*"A non-technical summary of the information provided under paragraphs 1 to 8"*	

Location in EIA Regulations 2017[9]	Requirement	Location in PEIR
Reg 14(2)(f)	*"Any additional information specified in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected"*	**Chapter 5: Air Quality** to **Chapter 20: Major Accidents and Disasters (Volume 1)**
Schedule 4(3)	*"A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge"*	**Chapter 2: Site and Proposed Scheme Description** and **Chapter 5: Air Quality** to **Chapter 20: Major Accidents and Disasters (Volume 1)**
Schedule 4 (5)(a)	A description of the likely significant effects of the development resulting from - "*the construction and existence of the development, including, where relevant, demolition works"*	**Chapter 5: Air Quality** to **Chapter 20: Major Accidents and Disasters (Volume 1)**
Schedule 4(5) (b)	A description of the likely significant effects of the development resulting from - *"the use of natural resources, in particular land, soil, water, and biodiversity, considering as far as possible the sustainable availability of these resources"*	**Chapter 7: Terrestrial Biodiversity (Volume 1)** **Chapter 8: Marine Biodiversity (Volume 1)** **Chapter 11: Water Environment and Flood Risk (Volume 1)**

Location in EIA Regulations 2017[9]	Requirement	Location in PEIR
		Chapter 16: Materials and Waste (Volume 1) **Chapter 17: Ground Conditions and Soils (Volume 1)**
Schedule 4(5) (c)	A description of the likely significant effects of the development resulting from - *"the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste"*	**Chapter 5: Air Quality (Volume 1)** **Chapter 6: Noise and Vibration (Volume 1)** **Chapter 7: Terrestrial Biodiversity (Volume 1)** **Chapter 8: Marine Biodiversity (Volume 1)** **Chapter 10: Townscape and Visual (Volume 1)** **Chapter 12: Climate Resilience (Volume 1)** **Chapter 13: Greenhouse Gases (Volume 1)** **Chapter 14: Population, Health and Land Use (Volume 1)** **Chapter 16: Materials and Waste (Volume 1)**

Location in EIA Regulations 2017[9]	Requirement	Location in PEIR
Schedule 4(5) (d)	A description of the likely significant effects of the development resulting from - *"the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)"*	**Chapter 2: Site and Proposed Scheme Description (Volume 1)** **Chapter 5: Air Quality (Volume 1)** **Chapter 6: Noise and Vibration (Volume 1)** **Chapter 9: Historic Environment (Volume 1)** **Chapter 14: Population, Health and Land Use (Volume 1)** **Chapter 15: Socio-economics (Volume 1)** **Chapter 17: Ground Conditions and Soils (Volume 1)** **Chapter 18: Landside Transport (Volume 1)**
Schedule 4(5) (e)	A description of the likely significant effects of the development resulting from - *"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"*	**Chapter 21: Cumulative Effects (Volume 1)**

Location in EIA Regulations 2017[9]	Requirement	Location in PEIR
Schedule 4(5) (f)	A description of the likely significant effects of the development 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"*	**Chapter 12: Climate Resilience (Volume 1)** **Chapter 13: Greenhouse Gases (Volume 1)**
Schedule 4(5) (g)	A description of the likely significant effects of the development resulting from - *"the technologies and the substances used"*	**Chapter 5: Air Quality** to **Chapter 20: Major Accidents and Disasters (Volume 1)**
Schedule 4(6)	*"A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved"*	**Chapter 4: EIA Methodology (Volume 1)** and **Chapter 5: Air Quality** to **Chapter 20: Major Accidents and Disasters (Volume 1)**
Schedule 4(8)	*"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. Relevant information available and obtained through risk assessments pursuant to EU legislation such as Directive 2012/18/EU of the European Parliament and of the Council (3) or Council Directive 2009/71/Euratom (4) or UK environmental assessments may be used for this purpose*	**Chapter 20: Major Accidents and Disasters (Volume 1)**

Location in EIA Regulations 2017[9]	Requirement	Location in PEIR
	provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies"	
Schedule 4(10)	*"A reference list detailing the sources used for the descriptions and assessments included in the Environmental Statement"*	**Chapters 1: Introduction** to **Chapter 22: Summary of Effects (Volume 1)**

1.6.6. A Glossary and Abbreviations list to define the terms used in this PEIR is provided at the front of **Chapter 1: Introduction (Volume 1)**.

1.7. THE ENVIRONMENTAL STATEMENT

1.7.1. The results of the EIA will be presented in an ES, which is produced to enable the SoS to take account of the environmental effects of the Proposed Scheme, when deciding whether or not to grant the DCO. The ES will be submitted as part of the application for development consent for the Proposed Scheme.

1.7.2. As with the PEIR, the ES will identify and set out any likely significant environmental effects, as well as any measures needed to mitigate likely significant adverse environmental effects, taking account of the Mitigation Hierarchy. The Mitigation Hierarchy is to first try to avoid, then prevent and then reduce likely significant adverse effects on the environment and, if possible, offset likely significant adverse effects on the environment. The Proposed Scheme's approach to mitigation is detailed in **Chapter 4: EIA Methodology (Volume 1)** of this PEIR.

1.7.3. The ES will also identify residual effects. Residual effects are effects which the Proposed Scheme is likely to have after mitigation measures have been implemented.

1.7.4. The ES will be produced in accordance with Regulation 14 of the EIA Regulations[9], including all necessary information required to fulfil Regulation 14(2)(a)-(f) and Schedule 4[9].

1.8. REFERENCES

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DECARBONISATION

CHAPTER 2: SITE AND PROPOSED SCHEME DESCRIPTION

Cory Decarbonisation Project

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TABLE

FIGURE (MAIN TEXT ONLY)

2. SITE AND PROPOSED SCHEME DESCRIPTION

2.1. SITE DESCRIPTION

2.1.1. The Site is displayed in **Figure 1-1: Site Boundary Location Plan (Volume 2)** and **Figure 1-2: Satellite Imagery of the Site Boundary Plan (Volume 2)**. The Site Boundary is located in Belvedere, within the LBB.

2.1.2. The Site is split into the following zones, which are shown on **Figure 1-3: Indicative Site Layout Plan (Volume 2)**:

- Riverside 1 and Riverside 2;
- Carbon Capture Facility;
- Proposed Jetty;
- Mitigation Area; and
- Temporary Construction Compounds.

2.1.3. Further information on the facilities, designations and surrounding area of the Site are described below.

RIVERSIDE 1 AND RIVERSIDE 2

2.1.4. This zone is designated in Local Plan policy as a strategic waste management site and forms part of the Belvedere Industrial Area, which is land designated as a Strategic Industrial Location[5]. It is accessible via Norman Road and includes the land occupied by Cory's existing (Riverside 1) and future (Riverside 2) EfW facilities, located in the centre of the Site Boundary. At the time of writing, Riverside 2 is being constructed.

2.1.5. Riverside 1 is one of the largest EfW facilities in the UK, with a maximum consented waste throughput of 850,000 tonnes per annum (tpa). Riverside 1 received 789,000 tonnes of non-recyclable waste in 2022.

2.1.6. Riverside 2 will be operational in 2026 and be one of the most efficient EfW facilities in the UK. Riverside 2 has a maximum consented waste throughput of 805,920 tpa of non-recyclable waste[2].

2.1.7. As with Riverside 1, Riverside 2 will utilise well-established moving grate incineration technology[1], which has been successfully deployed across numerous operational EfW facilities in the UK and globally.

2.1.8. Combined, Riverside 1 and Riverside 2 will generate enough electricity to power approximately 300,000 homes each year[2]. The two sites combined represent some 98% of the Applicant's total carbon footprint; hence the intention to incorporate new carbon capture infrastructure (i.e., the Proposed Scheme).

2.1.9. Riverside 1 and Riverside 2 are, uniquely, located on and utilise the River Thames. The majority of waste delivered to Riverside 1 is transported via barge shipment along the River Thames, and future waste will predominantly be delivered to Riverside 2 in this way. Incinerator bottom ash (IBA), ash from the combustion process, from Riverside 1 is transferred via the River Thames to the Port of Tilbury, to be processed into aggregate products for use in construction, in road paving and low-grade concrete[2]. Once operational the Riverside 2 IBA will be exported, and processed, in the same way.

2.1.10. The operation of the Carbon Capture Facility and the Proposed Jetty will have no impact on the waste throughput (and associated traffic and vessel movements) of Riverside 1 and Riverside 2.

2.1.11. The Riverside 1 and Riverside 2 zone includes the following elements of the Proposed Scheme; the flue gas supply ductwork, steam extraction and condensate return pipework, liquid CO_2 and gaseous CO_2 pipework, and access trestle to the Proposed Jetty. The ductwork and pipework will be located on new elevated process pipe and duct bridges, installed as part of the Proposed Scheme.

2.1.12. The Riverside 1 and Riverside 2 zone encompasses a section of the England Coast Path (which is also designated as a Public Right of Way (PRoW)(FP3)) and National Cycle Network Route 1 (NCN1), and PRoW FP4, as shown on **Figure 2-1: Environmental Constraints Plan - Public Rights of Way Cycle Routes and Metropolitan Open Land (Volume 2)**.

2.1.13. The Riverside 1 and Riverside 2 zone sits within Flood Zone 3[6] as shown on **Figure 2-2: Environmental Constraints Plan - Flood Zones (Volume 2)**.

CARBON CAPTURE FACILITY

2.1.14. This zone includes the land intended for the construction of two Carbon Capture Plants[a], to be located in the centre of the Site to the south of Riverside 1 and Riverside 2 as shown in **Figure 1-3: Indicative Site Layout Plan (Volume 2)**. The Carbon Capture Facility zone also includes the following elements: compression, conditioning, liquefaction, refrigeration, venting, liquefied CO_2 storage and loading and supporting plant.

[a] The evolving design is on the basis of two Carbon Capture Plants, however as part of ongoing design development the potential for a single Carbon Capture Plant will be considered. Two Carbon Capture Plants is considered as a worst-case for all technical chapters of this PEIR. For example, in terms of construction impacts, it is envisioned that two Carbon Capture Plants would result in the greatest construction traffic in comparison to one Carbon Capture Plant.

2.1.15. The Carbon Capture Facility zone contains seven land parcels of approximately 6.9 hectares in total named: the Eastern Paddock (approximately 1.6 hectares); the Stable Paddock (approximately 0.4 hectares); Borax North (approximately 1 hectare); Borax South (approximately 1.2 hectares); Creekside (approximately 0.9 hectares); Munster Joinery (approximately 0.8 hectares); and Gannon (approximately 1 hectare), as shown in **Figure 1-2: Satellite Imagery of the Site Boundary Plan (Volume 2)**. The Carbon Capture Facility zone can be accessed via Norman Road using gateways into the Creekside and Stable Paddock land parcels.

2.1.16. The Eastern and Stable Paddocks are currently part of the Crossness Local Nature Reserve (LNR). The Crossness LNR is approximately 25.5 hectares in size, including the land within the Eastern and Stable Paddocks within the Carbon Capture Facility zone. The land within the Eastern and Stable Paddocks covers approximately 2 hectares of the Crossness LNR and comprises coastal and floodplain grazing marsh habitat, dominated by typical neutral grassland species. The Eastern Paddock is grazed by horses all year round and so has a shorter sward than the Stable Paddock which is occasionally grazed. The Crossness LNR is adjacent (east) of the Crossness Sewage Treatment Works and is owned and managed by Thames Water Utilities Limited (TWUL) (hereafter referred to as Thames Water).

2.1.17. The remainder of the Crossness LNR typically contains areas of grazing marsh[3],with ponds and ditches, and areas of scrub and rough grassland. The western edge of the LNR is a protected area and is accessible by membership only.

2.1.18. The Carbon Capture Facility zone is located partially within the Erith Marshes Site of Importance for Nature Conservation (SINC), and partially within the Belvedere Dykes SINC[4]. There are also areas designated as Metropolitan Open Land (MOL)[5,b] , which stretches south of the A2016 Picardy Manorway/Eastern Way. The zone also includes a section of the Thames Marshes Corridor, a designated Strategic Green Wildlife Corridor as well as an area of the Southeast London Green Chain[5]. The Carbon Capture Facility zone falls within the Belvedere Industrial Area, which is land designated as a Strategic Industrial Location[5].

2.1.19. A secondary Thames Water Access Road is situated within this zone, located between the Borax North and South land parcels, as shown in **Figure 1-2: Satellite Imagery of the Site Boundary Plan (Volume 2)**. The access road connects Norman Road to the Crossness Sewage Treatment Works and is used for emergency vehicle access and access to the Stable Paddock and Great Breach Pumping Station.

2.1.20. The southern section of PRoW FP4 sits within this zone, as shown in **Figure 2-1: Environmental Constraints Plan - Public Rights of Way Cycle Routes and Metropolitan Open Land (Volume 2)**.

[b] The MOL designation shown within the Bexley Local Plan Polices Map[5] has been used during the preparation of this report.

2.1.21. The Carbon Capture Facility zone sits within Flood Zone 3[6], as shown on **Figure 2-2: Environmental Constraints Plan - Flood Zones (Volume 2)**, and areas designated as Functional Floodplain (Flood Zone 3b[65].

2.1.22. An intermediate pressure gas main owned and operated by Southern Gas Networks runs to the east of, and parallel to, the Iron Mountain and Asda Access Road. Underground electricity cables lie within the Borax North, Borax South, Creekside, Munster Joinery and Gannon land parcels and along Norman Road, in a north to south direction.

2.1.23. There are two Thames Water clean water mains that run along Norman Road, supplying water to Riverside 1 and Riverside 2. A foul sewer, with three accompanying manholes, is located at the southern end of Norman Road, in the southernmost area of the Carbon Capture Facility zone. A surface water sewer runs immediately to the east of the foul sewer.

PROPOSED JETTY

2.1.24. The Proposed Jetty zone is the northernmost area of the Site, predominantly located within the River Thames as shown on **Figure 1-3: Indicative Site Layout Plan (Volume 2).** It will contain the new Proposed Jetty, to export the LCO_2. The Proposed Jetty zone can be accessed via the existing Iron Mountain and Asda Access Road.

2.1.25. This zone contains two existing jetties that extend into the River Thames: Middleton Jetty (approximately 280m length), located adjacent (north) of Riverside 1; and the Belvedere Power Station Jetty (disused), which is located north of Iron Mountain Records Storage Facility. Middleton Jetty is designated as a Safeguarded Wharf[5] whereas the Belvedere Power Station Jetty is not listed amongst the Safeguarded Wharves Directions issued by the Secretary of State on 19 February 2021[7] nor marked as a Safeguarded Wharf[5] on Bexley Local Plan Policies Map[5]. Both jetties bridge across England Coast Path (FP3/ NCN1).

2.1.26. Approximately 75% of the waste processed at Riverside 1 is delivered to Middleton Jetty by tug pulled barges; removing the equivalent of 100,000 heavy goods vehicles (HGV) journeys per annum from the road[8]. Currently, there are approximately five tug and barge arrivals and five departures a day. Eight barges can be moored alongside Middleton Jetty at any one time (utilising the river and shore facing sides of this jetty). The waste is unloaded at Middleton Jetty and transferred on dock tractors and trailers to the Riverside 1 tipping hall[9]. Middleton Jetty is also used for the transport of IBA from Riverside 1 to a recycling facility at the Port of Tilbury. River-based transport will be used in the same way for Riverside 2 when operational.

2.1.27. The Proposed Jetty zone sits within Flood Zone 3[6] as shown on **Figure 2-2 - Environmental Constraints Plan - Flood Zones (Volume 2)**.

2.1.28. The Proposed Jetty zone is located within the River Thames and Tidal Tributaries SINC, as shown in **Figure 2-3: Environmental Constraints Plan - Statutory and Non-Statutory Ecological Designated Sites (Volume 2)**.

MITIGATION AREA

2.1.29. The Mitigation Area zone is located in the south and west of the Site as shown on **Figure 1-3: Indicative Site Layout Plan (Volume 2).** The land within this zone has been provisionally identified as part of the ongoing BNG Assessment to provide habitat mitigation, compensation and enhancement (including potential planting for landscaping). The Mitigation Area can be accessed via gateway at the southern end of Norman Road.

2.1.30. This zone consists of part of the Erith Marshes SINC, Metropolitan Open Land and Southeast London Green Chain[5]. The Thames Marshes Corridor passes through the zone. Additionally, a thin portion of the easternmost land within Crossness LNR is included in the west of this zone. These designations are shown on **Figure 2-1: Environmental Constraints Plan – Public Rights of Way Cycle Routes and Metropolitan Open Land** and **Figure 2-3: Environmental Constraints Plan - Statutory and Non-Statutory Ecological Designated Sites (Volume 2)**.

2.1.31. The Mitigation Area sits within Flood Zone 3[6], as shown on **Figure 2-2: Environmental Constraints Plan - Flood Zones (Volume 2)**, and areas designated as Functional Floodplain (Flood Zone 3b)[5].

2.1.32. FP2 runs through this zone in an east to northwest direction as shown in **Figure 2-1: Environmental Constraints Plan - Public Rights of Way Cycle Routes and Metropolitan Open Land (Volume 2)**.

2.1.33. An electricity substation is located in the southeast of the Gannon land parcel within the Mitigation Area. There are also underground electricity cables that cross this zone in a west to east direction, within the Peabody land parcel.

2.1.34. It should be noted that in addition to the Mitigation Area there are some offsite areas, termed Environmental Mitigation Opportunity Areas, being explored for enhancement and mitigation. These are described in **Chapter 7: Terrestrial Biodiversity (Volume 1)** and illustrated on **Figure 7-7: Environmental Mitigation Opportunity Areas (Volume 2)**. These do not form part of the Site. Further information on these will be provided within the ES.

TEMPORARY CONSTRUCTION COMPOUNDS

2.1.35. Temporary Construction Compounds will be located centrally within the Site, within the Carbon Capture Facility zone, as shown on **Figure 1-3: Indicative Site Layout Plan (Volume 2)**. Whilst construction activities will be present across the Site, uses including (but not limited to) laydown, construction activities, offices, warehouses, workshops, open air storage and car parking will be focussed in these two areas. Following completion of the construction works for the Proposed Scheme the land in this zone will be utilised as part of the Carbon Capture Facility. The Temporary Construction Compounds zone can be accessed via Norman Road using existing gateways into the Gannon land parcel and off the Thames Water Access Road.

2.1.36. The Temporary Construction Compounds comprise three land parcels: Borax South; Munster Joinery; and the northern half of the Gannon land parcel. Norman Road runs to the east of the two compounds, as shown on **Figure 1-2: Satellite Imagery of the Site Boundary Plan (Volume 2)**.

2.1.37. The Temporary Construction Compounds sit within Flood Zone 3[6], as shown on **Figure 2-2: Environmental Constraints Plan - Flood Zones (Volume 2)**, and areas designated as Functional Floodplain (Flood Zone 3b)[5].

SURROUNDING AREA

2.1.38. The Site is located within the Belvedere Industrial Area, a Strategic Industrial Location[5] comprising a number of industrial estates, including:

- Hailey Road Industrial Estate, approximately 60m south of the Site Boundary;
- Fishers Way Industrial Estate, approximately 80m east of the Site Boundary;
- Waldrist Way Industrial Estate, approximately 330m southwest of the Site Boundary;
- Crabtree Manorway North, approximately 600m east of the Site Boundary; and
- River Wharf Business Park, approximately 600m east of the Site Boundary.

2.1.39. The closest individual business operations adjacent to the Site Boundary are the Lidl Warehouse/Belvedere Regional Distribution Centre located adjacent (southeast), and Iron Mountain Records Storage Facility (adjacent east). Asda Belvedere Distribution Centre is located adjacent (east) of the Site Boundary. Other individual business operations in proximity to the Site Boundary include:

- Ctr Group, approximately 80m south;
- Howdens Joinery, approximately 90m south;
- Tap'in 3PL Ltd, approximately 95m south;
- The Morgan Pub and Restaurant, approximately 35m south;
- Travelodge London Belvedere, approximately 55m east;
- Snap Fitness, approximately 90m east;
- HS Carlsteel Engineering Ltd, approximately 95m south;

- Freshasia Foods Ltd., approximately 100m south;
- Intersped Logistics (UK) Limited, approximately 90m south;
- Starbucks Drive Thru and Lidl, approximately 110m southeast;
- Belvedere Wharf, approximately 350m east;
- Asda ASC Recycling Centre, approximately 330m east; and
- The Amazon UK DBR1 and Erith Driving Test Centre, approximately 380m east.

2.1.40. The Crossness Sewage Treatment Works, located approximately 230m to the west of the Site Boundary, comprises a disused sludge incinerator and the Crossness Pumping Station. The Crossness Sewage Treatment Works treats wastewater from south and southeast London and is operated by Thames Water. To the north of the Crossness Sewage Treatment Works is the Thames Water Jetty.

2.1.41. The residential area of Belvedere, which includes Franks Park and Bexley College, is located approximately 170m south of the Site Boundary at its closest point. Thamesmead residential area is located approximately 1.7km northwest of the Site Boundary. Rainham Landfill is located approximately 2km east of the Site Boundary on the northern bank of the River Thames. Community facilities lie within 100m of the Site Boundary including: the Morgan Public House, approximately 40m east (on the A2016 Picardy Manorway); Travelodge London Belvedere approximately 55m east; and churches and primary schools all located approximately 60m southeast. The London LOOP is located approximately 1km southeast of the Site Boundary. Further information about residential properties and community facilities is in **Chapter 14: Population, Health, and Land Use (Volume 1)** of this PEIR.

2.1.42. The Site is accessed by Norman Road, which connects with the A2016 Picardy Manorway to the south and east. Belvedere Railway Station is located approximately 600m south and there are numerous bus stops in the surrounding area. PRoW FP1, FP2, FP3 (Thames Path), FP4 and FP242 are located within 500m of the Site Boundary, as shown on **Figure 2-1: Environmental Constraints Plan - Public Rights of Way Cycle Routes and Metropolitan Open Land (Volume 2)**.

2.1.43. The Rainham Marshes LNR and Inner Thames Marshes Site of Special Scientific Interest (SSSI) are located approximately 900m east of the Site Boundary, across the River Thames. The Lesnes Abbey Woods LNR is located approximately 1.2km south of the Site Boundary. Further information on sites designated for their biodiversity value is in **Chapter 7: Terrestrial Biodiversity (Volume 1)** and **Chapter 8: Marine Biodiversity (Volume 1)** of this PEIR.

2.1.44. Crossness Conservation Area is located approximately 760m to the west of the Site Boundary. The Conservation Area includes three listed buildings; Workshop Range to South East of Main Engine House (A2), Crossness Pumping Station (A3) and Workshop Range to South West of Main Engine House (A4), the listed buildings are all located approximately 900m west of the Site Boundary. Grade II listed No. 4 Jetty and Approach at Dagenham Dock located 750m north west of the Site Boundary. The location of these assets is shown in **Figure 2-4: Environmental Constraints Plan - Heritage Features (Volume 2)**. The Site Boundary lies within the Thamesmead and Erith Marshes Archaeological Priority Area. Further information on heritage assets is in **Chapter 9: Historic Environment (Volume 1)** of this PEIR.

2.2. PROPOSED SCHEME DESCRIPTION

CARBON CAPTURE FACILITY

The Carbon Capture Plants

2.2.1. The Carbon Capture Facility is the installation of post combustion carbon capture technology to capture CO_2 from Riverside 1 (in operation) and Riverside 2 (due to be operational by 2026). It will capture a minimum of 95% of CO_2 emissions from Riverside 1 and 95% of CO_2 emissions from Riverside 2 once operational, which is equivalent to approximately 1.3Mt CO_2 per year[10]. The capture rate is the annual average. Furthermore, with the feedstock to Riverside 1 and Riverside 2 comprising approximately 50% biogenic content, the Carbon Capture Facility would result in net-negative CO_2 emissions of approximately 0.6Mt per year of CO_2[10]. As such, the Proposed Scheme will be part of a regional effort to enable the decarbonisation of emissions in London and the southeast of England.

2.2.2. Two Carbon Capture Plants are currently proposed, one for each of Riverside 1 and Riverside 2; however, a single Carbon Capture Plant is also being considered[c]. As discussed in Chapter 3, if two plants are built construction could be phased.

[c] The evolving design is on the basis of two Carbon Capture Plants, however as part of ongoing design development the potential for a single Carbon Capture Plant will be considered. Two Carbon Capture Plants is considered as a worst-case for all technical chapters of this PEIR. For example, in terms of construction impacts, it is envisioned that two Carbon Capture Plants will result in the greatest construction traffic in comparison to one Carbon Capture Plant.

2.2.3. The captured CO_2 will be processed in the Carbon Capture Plants before undergoing compression, conditioning, and liquefaction, prior to being stored on site ready for export. The CO_2 will be temporarily stored on site in a liquid form (LCO_2) and then loaded and transported via ship for permanent sequestration underground. The supply chain and potential transportation and storage of LCO_2 has been considered as part of the development of the Proposed Scheme to ensure it is compatible with the operational model of available storage sites. However, the transportation and underground storage of LCO_2 does not form part of the Proposed Scheme (albeit the emission from these activities is dealt with in **Chapter 13: Greenhouse Gases (Volume 1)**). The availability of potential storage sites is outlined in **Chapter 3: Consideration of Alternatives (Volume 1)** with further details provided in the Liquified CO_2 Storage and Loading System section (see **Paragraph 2.2.32** onwards) of this chapter.

2.2.4. The Carbon Capture Facility is likely to contain the following elements (shown below in **Figure 2-5: The Key Elements of the Carbon Capture Facility**):

- Two Carbon Capture Plants, each comprising:
  - Flue Gas Pre-Treatment (to include the Direct Contact Cooler);
  - Absorber Column;
  - Solvent Regeneration System; and
  - Rich Solvent/Lean Solvent Heat Exchanger.
- Two CO_2 Compression, Conditioning and Liquefaction Plants, each comprising:
  - Compression;
  - Dehydration;
  - Liquefaction and Refrigeration; and
  - Vent stack.
- Liquified CO_2 (LCO_2) Storage and Loading, to include:
  - Temporary Onshore Storage; and
  - Marine Loading and Boil-Off Gas (BOG) Processing (with the loading taking place within the Proposed Jetty zone).
- Supporting Plant, comprising:
  - Cooling System (shared between the Carbon Capture Plants);
  - Flue Gas Supply Ductwork (for each of the Carbon Capture Plants if there are two);
  - Stream Extraction and Steam Processing (for each of the Carbon Capture Plants if there are two);
  - Back Pressure Turbine and Generator (for each of the Carbon Capture Plants if there are two);
  - Chemical Storage and Distribution Handling Facilities (shared between the Carbon Capture Plants);

- Solvent Storage (shared between the Carbon Capture Plants);
- Water Treatment Plant (Process Water Supply) (shared between the Carbon Capture Plants); and
- Wastewater Treatment Plant (shared between the Carbon Capture Plants).

2.2.5. These elements are described further below.

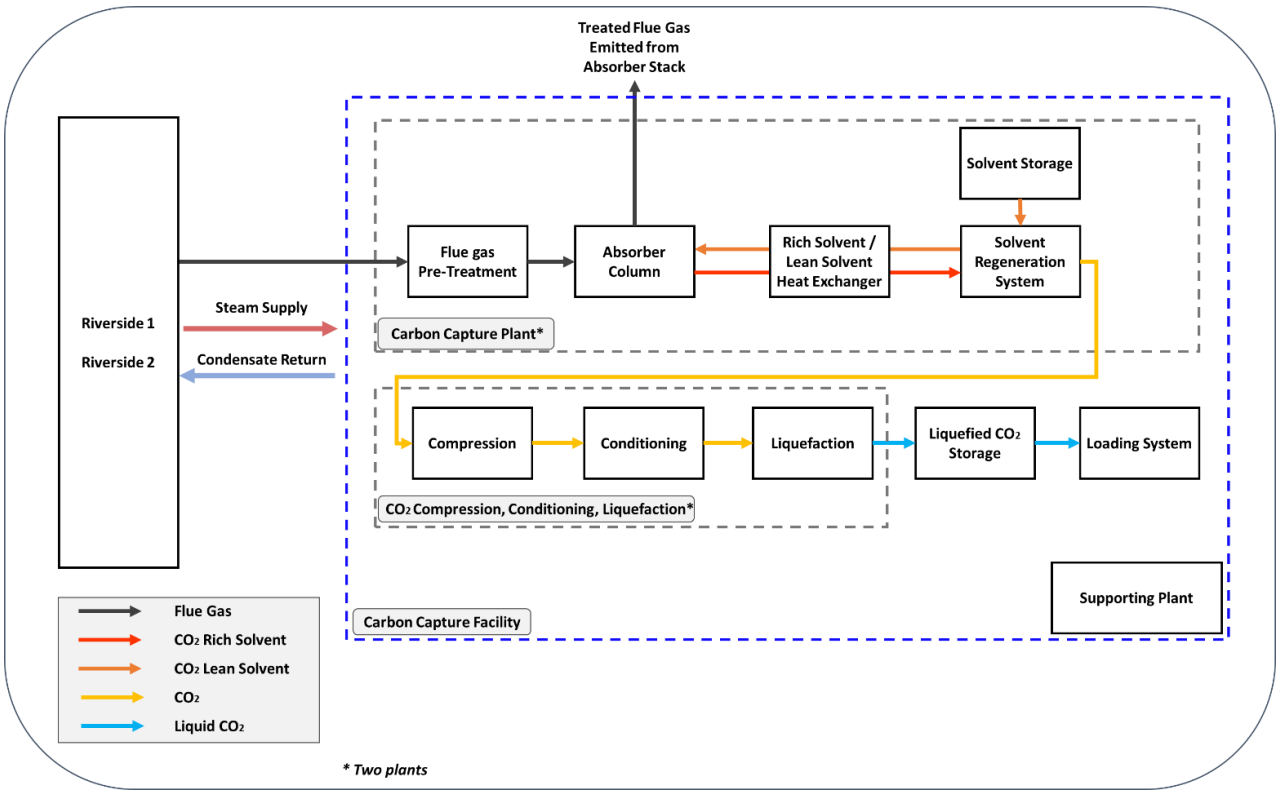

Figure 2-5: The Key Elements of the Carbon Capture Facility

Flue Gas Pre-Treatment

2.2.6. A new connection into the existing flue gas lines of Riverside 1 and Riverside 2 will be required, prior to their existing exhaust stacks[d], to route the flue gas through new ducting into the Carbon Capture Plants.

2.2.7. Flue gas conditioning is achieved through a Direct Contact Cooler. This cools and condenses water out of the saturated flue gas and treats residual components within the flue gas prior to it reaching the Absorber Column (described below).

2.2.8. An induced draft fan will be installed within the Carbon Capture Plants to increase the pressure of the cooled flue gas and overcome the pressure drop across both Carbon Capture Plants.

[d] Riverside 1 has three flue gas lines and one exhaust stack and Riverside 2 (once constructed) will have two flue gas lines and two exhaust stacks.

Absorber Column

2.2.9. In the Absorber Column the cooled flue gas will move upwards through the Column, with the amine-based solvent being supplied from the top. As the flue gas moves upwards, the CO_2 within the flue gas will be absorbed by the amine-based solvent. Post CO_2 absorption, the flue gas will continue upwards to the water wash component of the Absorber Column. This will maintain the flue gas water balance, recover chemical vapour and control chemical emissions. Additional wash stages will be provided, if required, to meet environmental discharge limits that will be set out in the future environmental permit.

2.2.10. The treated flue gas will be re-heated prior to being emitted to the atmosphere. The heat transfer would be undertaken via an intermediate heat transfer fluid, such as treated water or a glycol/water blend.

2.2.11. The treated flue gas will then be emitted into the atmosphere, via a new Absorber Stack at the top of the Absorber Column (being one per Carbon Capture Plant or just one column). There will be a stack on each Absorber Column, adding two new stacks to the Riverside Campus. The overall stack height will be comparable to the height of the existing Riverside 1 and future Riverside 2 stacks. The flue gas emissions will be continuously monitored via a Continuous Emissions Monitoring System (CEMS).

2.2.12. The CO_2 rich amine-solvent will accumulate at the bottom of the Absorber Column, where it will be pumped through a solution heat exchanger to the Regenerator Column (described below).

Solvent Regeneration System

2.2.13. The Solvent Regeneration System consists of the Regenerator Column and Solvent Processing System.

2.2.14. In the Regenerator Column, low-pressure steam indirectly heats the CO_2-rich amine-based solvent solution, stripping the CO_2 from the amine-based solvent solution. A condenser then condenses the solvent vapours, releasing the (wet) CO_2-rich stream to be sent for downstream CO_2 Compression and conditioning. The steam will be supplied from the Riverside 1 and Riverside 2 boilers and is gained via the new back-pressure steam turbine to provide steam at the temperature and pressure conditions required by the regenerator reboiler.

2.2.15. The Solvent Processing System consists of a filtration and reclamation system, to remove any heat stable salts (HSS) and degradation products in the amine-based solvent. Lost solvent will be replaced by fresh solvent from the Solvent Storage tanks located in this zone.

2.2.16. Small volumes of amine-loaded waste will be produced from the Solvent Regeneration System. Further detail is provided with the Solvent Storage section (see **Paragraph 2.2.49** and **Paragraph 2.2.50**).

Rich Solvent/Lean Solvent Heat Exchanger

2.2.17. The CO_2-lean solvent is required to be cooled prior to be being sent back to the Absorber Column to absorb CO_2 once again from the incoming flue gas.

2.2.18. The CO_2-rich solvent is required to be pre-heated prior to the regeneration process as part of the Solvent Regeneration System.

2.2.19. A Rich Solvent/Lean Solvent Heat Exchanger is utilised. This acts to:

- cool the CO_2-lean solvent at the Regenerator Column outlet before it is further cooled via the Cooling Water System, prior to the Absorber Column; and
- heat the CO_2-rich solvent at the Regenerator Column inlet.

2.2.20. This heat integration within the Carbon Capture Plants both reduces external cooling demands (and hence energy consumption of the Cooling Water System) and reduces the amount of steam required. The CO_2-lean solvent is further cooled via the Cooling Water System (within the section Supporting Plant).

CO_2 Compression, Conditioning and Liquefaction Plants

2.2.21. The captured CO_2 will undergo compression, dehydration, removal of contaminants and liquefaction to meet the stipulated conditions for onwards ship export and permanent sequestration underground.

Compression

2.2.22. The captured (wet) CO_2 will be transferred from the Regenerator Column to the Compression Plant, using above ground pipelines. There will be two Compressor Packages, for each Carbon Capture Plant. Compression of the low pressure, wet CO_2 will be undertaken in stages with the CO_2 water cooled between compression stages.

2.2.23. The compressed CO_2, at around 16 bar pressure and a temperature of -40°C, will be routed via above ground pipelines for Conditioning (described below).

Conditioning

2.2.24. After compression, the CO_2 stream will need to be dehydrated prior to liquefaction, as it will still be water saturated, in order to avoid the water freezing in the liquefaction plant.

2.2.25. Solid desiccant dehydration will be used; is a process utilising adsorption to retain water on the surface of the desiccant particles, typically within adsorber vessels.

2.2.26. Dehydrated CO_2 will be routed for liquefaction and refrigeration via above ground pipelines.

Liquefaction and Refrigeration

2.2.27. The liquefaction process consists of passing the dry CO_2 stream through a heat exchange system, in which it is condensed against an evaporating refrigerant (from a separate refrigeration package).

2.2.28. A distillation column may be required post liquefaction to remove non-condensable components, such as oxygen, so that the CO_2 export specification can be met. Ongoing design development will ascertain the requirement for this column.

Venting

2.2.29. There will be a requirement of operational and emergency venting of CO_2. Operational venting occurs during start-up and shutdown (during maintenance outages or emergency shutdown scenarios) of the Carbon Capture Facility, and emergency venting in the event of any unscheduled shutdowns.

2.2.30. There will be separate Supported CO_2 Vents for the small volumes of such CO_2 venting, with larger volumes such as those during start-up/shutdown to be routed back into the new stack at the top of the Absorber Column. The ongoing design development will provide further information on the venting approach.

2.2.31. Any operational and emergency venting of CO_2 will need to meet environmental limits which will be set out in the future environmental permit as issued by the Environment Agency.

Liquefied CO_2 Storage and Loading System

Temporary Onshore Storage

2.2.32. Temporary onshore storage is required to store the LCO_2 prior to onwards ship export via the Proposed Jetty. This will be stored in insulated, pressurised, above ground storage tanks. As detailed in **Chapter 3: Consideration of Alternatives (Volume 1)**, two options are being considered:

- multiple tall vertical storage tanks located landside; or
- multiple spherical storage tanks located landside.

2.2.33. In terms of the assessments being undertaken within this PEIR, **Chapter 10: Townscape and Visual (Volume 1)** has assessed tall vertical tanks (representative of the worst-case) whilst the remainder of the technical chapters have assessed the spherical tanks which have a greater footprint. For this reason, spherical tanks were used to inform the extent of the Carbon Capture Facility as a design precautionary worst case at this stage.

2.2.34. As the LCO_2 is stored at saturated conditions, a small amount of boil-off gas (BOG) will be generated. This will be collected and sent to be re-liquefied, with any additional BOG that cannot be processed, and sent to a Supported CO_2 Vent within the Carbon Capture Facility zone.

Marine Loading and BOG Processing

2.2.35. The LCO_2 will be pumped from the LCO_2 storage tanks to the Proposed Jetty via above ground pipelines. The pipelines will follow a route on the landside Elevated Process Pipe and Duct Bridge, leading to the Elevated Process Pipe Bridge on the Proposed Jetty, delivering the LCO_2 into tanks within the vessels via a Marine Loading Arm. The LCO_2 will be loaded through one or more manifolds located around the centre of the vessels. The loading equipment would be sized so that vessel turnaround time is less than 12 hours.

2.2.36. The loading process will displace CO_2 vapour within the tanks within the vessels. This will be routed back to the Carbon Capture Plants via a Vapour Return Arm located on the Proposed Jetty, and a vapour return pipeline located on the Elevated Process Pipe and Duct Bridge.

2.2.37. The CO_2 vapour will be combined with the BOG from the above ground storage tanks and sent to be re-liquefied at either of the Carbon Capture Plants. If there is any BOG that is unable to be re-liquefied, it would be vented via a separate Supported CO_2 Vent. However, venting of BOG will not be a normal operation and will be a very infrequent event.

LCO_2 Geological Storage Locations

2.2.38. The final LCO_2 storage locations do not form part of the Proposed Scheme. However, these locations have been considered for the purposes of the assessment of the 'downstream' effects of the ship export movements for transporting the LCO_2 within **Chapter 13: Greenhouse Gases (Volume 1)** of this PEIR.

2.2.39. Of the options listed within **Chapter 3: Consideration of Alternatives (Volume 1)**, the assessment within **Chapter 13: Greenhouse Gases (Volume 1)** considers the transportation of LCO_2 for the geological storage destination option that is the furthest distance from the Site Boundary, representative of the reasonable worst-case scenario. This storage location option is in the North Sea, approximately 1,150km in shipping distance from the Site Boundary. However, as detailed in **Chapter 3: Consideration of Alternatives (Volume 1)** the Applicant is currently engaging with a variety of storage providers.

Supporting Plant

Cooling System

2.2.40. There is no additional capacity within the Cooling Systems for either Riverside 1 or Riverside 2. A new, standalone Cooling System will be provided for the Carbon Capture Facility.

2.2.41. A hybrid approach consisting of reducing demand by treating potable water, supplemented by the internal recycling of the process wastewater has been assessed to be the optimum solution for the Carbon Capture Facility (as concluded in **Chapter 3: Consideration of Alternatives (Volume 1)**). This will comprise Wet-Dry Cooling Towers, a cooling water circuit and cooling water supply pumps. This infrastructure will be common for both Carbon Capture Plants and both the CO_2 Compression, Conditioning and Liquefaction Plants.

Flue Gas Supply Ductwork

2.2.42. A new connection into the flue gas lines, known as flues, for Riverside 1 and Riverside 2 will be required, prior to their respective exhaust stacks, to route the flue gas via new ducting to each of the Carbon Capture Plants. The new tie-ins to the flues will include a damper (shut-off valve) to enable flue gas to be directed to either the Carbon Capture Plants, or to the respective Riverside 1 or Riverside 2 stacks if the Carbon Capture Plants are not able to operate or are operating at reduced capacity.

Stream Extraction and Steam Processing

2.2.43. Steam is required for several processes within the Carbon Capture Facility. Predominantly, steam is supplied for indirect use in the Solvent Regeneration System, in which heat is dissipated to release the CO_2 from the CO_2-rich amine based solvent.

2.2.44. For the Carbon Capture Plants, steam will be extracted from Riverside 1 and Riverside 2 respectively and supplied to the required process via above ground pipelines.

Back Pressure Turbine and Generator

2.2.45. To maximise process efficiency, the Carbon Capture Plants will be supported by one Back Pressure Turbine and one Pressure Reducing De-Superheating Station. The Back Pressure Turbine will maximise the extraction of energy within the steam. The Pressure Reducing De-Superheating Station will refine the temperature and pressure of the steam exiting the Back Pressure Turbine, to make it suitable for use in the Solvent Regeneration System.

2.2.46. In addition to conditioning the steam required for the carbon capture process, the Back Pressure Turbine will also supply an amount of the electrical power required for the Proposed Scheme. The thermal energy within the steam entering the Back Pressure Turbine will be used to rotate the turbine shaft and subsequently drive the generator, thus generating power. In addition to the shared ancillary infrastructure described below, electrical power is required for the following elements of the Carbon Capture Facility:

- induced draft fan for the flue gas;
- CO_2 Compression;
- CO_2 Liquefaction – refrigeration;
- pumps for CO_2-lean and CO_2-rich solvent circulation; and
- cooling water supply pumps.

2.2.47. The remaining power supply for the Proposed Scheme will be supplied from the power generated by Riverside 1 and Riverside 2.

Chemical Storage and Distribution Handling Facilities

2.2.48. Chemical Storage and Distribution Handling Facilities are necessary to process the amine-based solvent required for both of the Carbon Capture Plants and for the Water Treatment Plant (described in **Paragraph 2.2.51** to **Paragraph 2.2.55**). This will comprise new chemical storage tanks and warehousing for materials including, but not limited to: amine-based solvent; caustic soda; anti-foam; sulphuric acid; sodium hypochlorite; sodium bisulphite; antiscalent; and amine solvent waste.

Solvent Storage

2.2.49. Amine Solvent Storage tanks will be located within the Carbon Capture Facility, to store a supply of fresh amine solvent for both plants within the Carbon Capture Facility. Small volumes of amine-loaded sludge will be produced as a by-product of the carbon capture process. This will be temporarily stored onsite prior to being transported offsite to an appropriate waste treatment facility as hazardous waste.

2.2.50. A single set of storage tanks will be common to the Carbon Capture Plants and CO_2 Compression, Conditioning and Liquefaction Plants.

Water Treatment Plant – Process Water Supply

2.2.51. A Water Treatment Plant is required within the Carbon Capture Facility (which is likely to be located on the Munster Joinery land parcel) to provide process water for the evaporative cooling, wash water and chemical makeup systems. The feed water supply will use a combination of potable water from Thames Water (Water Supply Zone: 0105) and recycled effluent from the Carbon Capture Facility; for further information on the routing of the feed water supply see **Section 3.6** of **Chapter 3: Consideration of Alternatives (Volume 1)**. The design of the Carbon Capture Facility has included water recycling where possible, to minimise potable water demand and wastewater generation from the Carbon Capture Facility.

2.2.52. The potable water requires minimal treatment for use in the Cooling System, focussed on chemical dosing for scale and biological control.

2.2.53. The condensate from the flue gas Direct Contact Cooler will be cooled before treatment, by ultrafiltration, to remove particulate matter. The filtered flue gas condensate will then either:

- be blended with potable water for use in the Cooling System; or
- undergo further treatment by reverse osmosis to produce the demineralised water used in the flue gas water wash (Absorber Column).

2.2.54. Blowdown water from the cooling towers will be treated in an independent process by nanofiltration. Recycling the blowdown cooling water minimises the demand on potable water and substantially reduces the volume of effluent produced.

2.2.55. A single Water Treatment Plant will provide water to the Carbon Capture Plants, and for CO_2 Compression, Conditioning and Liquefaction. The Water Treatment Plant will be contained within the same building as the Wastewater Treatment Plant (described below).

Wastewater Treatment Plant

2.2.56. Wastewater will be generated by the Water Treatment Plant itself. This will include backwash water from the ultrafiltration membrane process, concentrate from the nanofiltration membrane process and membrane cleaning solutions. Backwash water will be treated and recycled back into the cooling water supply. Membrane cleaning solutions will be neutralised.

2.2.57. Two disposal route options remain in consideration, as described in **Chapter 3: Consideration of Alternatives (Volume 1)**:

- Route 1 – Discharge to the local foul sewer (with or without treatment, depending on trade effluent consents). Prior to discharge the sludge produced would go through a settlement process. Nanofiltration concentrate and neutralised cleaning solutions will be blended before discharge into the local foul sewer.
- Route 2A – Discharge to the River Thames via a new outfall from the Proposed Jetty. Only the nanofiltration concentrate and neutralised cleaning solutions will be blended, and treated if required to meet discharge permit limits, before being discharged into the River Thames. Sludge produced through the settlement process will be further dewatered to produce a solid waste, to be collected by a specialised waste contractor. Water produced during the further dewatering process will be recycled back into the Cooling System.

2.2.58. It is not proposed to recycle amine wastewater into the Water Treatment Plant. The volume of amine wastewater effluent is expected to be comparatively small; therefore, the waste will be disposed of by specialised contractors, taking the waste offsite for disposal via road tanker.

2.2.59. A single Wastewater Treatment Plant is required for the Proposed Scheme. The Wastewater Treatment Plant will be contained within the same building as the Water Treatment Plant (described above).

PROPOSED JETTY

2.2.60. A new and dedicated export structure is required to export the LCO_2. The Proposed Jetty will be located in the River Thames. Two options are being considered for the arrangement of the Proposed Jetty (Option 2 and Option 3, as described in **Chapter 3: Consideration of Alternatives (Volume 1).** When compared to Option 3, Option 2 is located furthest into the channel of the River Thames, approximately 130m downstream of the existing Middleton Jetty, with its front face approximately 180m from the southern bank of the River[e]. The Proposed Jetty will comprise the following key features:

- Loading Platform;
- Breasting Dolphins;
- Mooring Dolphins;
- Access Trestle; and
- Access Catwalks.

2.2.61. The main function of the Loading Platform is to facilitate the loading of LCO_2 into the tanks within the vessels. The structure will be formed of a concrete reinforced deck supported by tubular steel piles. In addition to quick release hooks, the topside infrastructure will feature the following elements: the Marine Loading Arm and Vapour Return Arm; Elevated Process Pipe Bridge; lighting; fire suppression systems; and space for a standard London Fire Brigade fire engine to manoeuvre.

2.2.62. The Breasting Dolphins will be positioned either side of the Loading Platform, comprising two fender cones arranged vertically with fender panels. The fenders will be supported by tubular steel piles. The purpose of the Breasting Dolphins is to absorb some of the loads whilst the vessels are berthing.

2.2.63. The Mooring Dolphins will be positioned on either side of the Loading Platform, to secure the vessels with mooring lines. The concrete decks will support a double-quick release hook, assisting vessel berthing, and will be supported by tubular steel piles. The Mooring Dolphins will be positioned back from the Loading Platform to ensure mooring lines are of a suitable length and angle.

[e] It is assumed that all piling activities will have a 600mm diameter and will be 12m in length.

2.2.64. The Access Trestle will connect the Loading Platform to land and support above ground pipes, including LCO_2, running the length of the Proposed Jetty. It will also provide access for pedestrians, emergency and maintenance vehicles. The Access Trestle will run from the eastern side of the Riverside 1 building, over the England Coast Path (FP3/NCN1) and flood wall, to the rear edge of the Loading Platform. The Trestle comprises a deck featuring a concrete and tarmac roadway atop a steel frame structure, which will be supported by tubular steel piles.

2.2.65. The Access Trestle for the Proposed Jetty will span over the Thames Path and footprint of the Belvedere Power Station Jetty (disused). Design development is considering whether to retain or demolish and remove this jetty as part of the construction process of the Proposed Jetty. In the event that the Belvedere Power Station Jetty is retained, the proposed Access Trestle will have to be designed and constructed to accommodate the existing structure being left in place (i.e., wider pile spacing at that location). FP3 (Thames Path) will be retained in either outcome; however, overhead construction activities will be undertaken across FP3 (Thames Path).

2.2.66. Access Catwalks will connect the Mooring Dolphins to the Loading Platform providing pedestrian access (with railings for safety).

2.2.67. A minimum water depth will be required to provide vessel access at all states of the tide. Construction dredging will therefore be required to provide access to/from the River Thames shipping channel to the Proposed Jetty, including the creation of a berthing pocket for berthing of vessels.

2.2.68. The berthing of tugs will be facilitated via a landing pontoon to be located at the rear of the Proposed Jetty. The envisaged form of construction is a proprietary pontoon with restrained steel tubular piles for vessel access at various states of the tide. Access to the landing pontoon will be via a walkway connected to the Loading Platform.

2.2.69. Electrical power is required for the following elements of the Proposed Jetty: lighting, Marine Loading Arm; Vapour Return Arm; and the associated control panel. The electrical power will be supplied from Riverside 1 or Riverside 2 (once operational).

ANCILLARY INFRASTRUCTURE

2.2.70. The following sections describe the ancillary infrastructure required within the Proposed Scheme.

Potable Water Supply

2.2.71. A new potable water connection will be required to Thames Water's water main, located within the southern area of Norman Road.

Wastewater Discharge

2.2.72. A new connection to the local foul sewer network will be required, should Route 1 (as described in the Wastewater Treatment Plant section above) be selected. The nearest foul sewer is located at the junction between Norman Road and A2016 Picardy Manorway. This connection will enable wastewater conveyance between the Proposed Scheme and the foul sewer network.

2.2.73. Should Route 2A (as described in the Wastewater Treatment Plant section above) be selected, a new outfall off the Proposed Jetty will be required. The wastewater discharge flow velocity would be at approximately 0.012m^3/s.

2.2.74. The wastewater discharge is anticipated to be cooled via a heat exchanger to ensure the temperature of the wastewater discharge is +/- 5°C (or less) from the in-situ River Thames temperature at the time of the wastewater discharge.

Surface Water Drainage

2.2.75. The Proposed Scheme will require a new drainage system within the Site. The drainage system will use the existing ditches within the Site as a point of connection, with attenuation tanks, filter drains and ponds utilised to control the discharge quality and rate to the ditches. The proposed drainage would include a system of containment to mitigate the potential risk of pollution to the surrounding site area and/or environment. This would include bunded areas around chemicals for quench and the Absorber Column, solvent storage/make-up system, LCO_2 Storage, diesel generator and storage, compressor lube oil and refrigerant area. Additionally, a downstream defender will be installed at all outfall locations. These, in combination with the filter drains and any open Sustainable Drainage Systems ((SuDS) such as attenuation ponds) will provide an adequate level of pollution control from the Proposed Scheme.

2.2.76. An Outline Drainage Strategy will be developed and included within the application for development consent.

Main Electrical Infrastructure

2.2.77. Electrical infrastructure will comprise the following main components (which is likely to be located on the Munster Joinery land parcel):

- 132kV switchroom for the main 132kV power supply;
- transformers to facilitate the supply of power to the elements of the Proposed Scheme that require electrical power;
- uninterruptible power supply (UPS);
- back-up power in the form of diesel generators, requiring diesel storage tanks local to the generators;
- motor control centres to control the electric motors of equipment onsite; and
- site cabling.

Lighting and CCTV

2.2.78. Site lighting infrastructure including lighting columns will be required, as will security infrastructure including closed-circuit television (CCTV). An Outline Lighting Strategy will be developed and included within the application for development consent.

Access Roads and Site Boundary Fencing

2.2.79. The Proposed Scheme will require new internal site roads, with access from Norman Road. The Proposed Scheme will have security fencing installed around the full Site Boundary.

Gatehouse, Control Room, Welfare, Stores and Workshop

2.2.80. The Proposed Scheme will be treated as a separate facility to Riverside 1 and Riverside 2, thus it will have the following new items (which are likely to be located on the Munster Joinery land parcel):

- gatehouse and car park;
- control room and welfare facilities; and
- workshop and stores.

Heat Recovery and Heat Transfer System

2.2.81. The carbon capture process produces heat, which is typically wasted. The Proposed Scheme will incorporate a heat recovery and heat transfer system so that this energy can instead be captured and redirected into a district heating network, such as the Riverside Heat Network. The Riverside Heat Network is under development and is currently capable of diverting up to 28.6MWth of heat from Riverside 1, benefitting up to 25,000 homes and businesses in the local area. The Riverside Heat Network is capable of scaling significantly and could utilise further additional heat from Riverside 2 and the Proposed Scheme. The Proposed Scheme has the potential to provide over 100MWth of additional heat which would benefit an even greater number of homes and businesses.

2.2.82. The heat recovery and heat transfer system will consist of:

- heat offtake equipment (heat recovery) local to the heat sources, to transfer the waste heat to the circulating heat transfer medium; or routing hot process streams directly to the heat transfer system via separate insulated pipes;
- insulated pipework that will run from the heat offtake equipment or heat sources south of Riverside 1 and Riverside 2, and from the Carbon Capture Plants to the heat transfer station; and
- a heat transfer station as the interface between the Proposed Scheme and the Riverside Heat Network, consisting of the main operating plant and water treatment equipment to support the heat system, thermal storage and potentially back up heat generating plant in the event of outages.

MITIGATION AREA

2.2.83. Land has provisionally been identified as part of the ongoing EIA and BNG work in relation to ecological, landscape and access issues to provide a variety of mitigation, compensation and enhancement outcomes. For example, some of the land in this zone is also anticipated to be open to the public and will incorporate PRoW diversions if required. The measures to be provided in this area is subject to ongoing design development and will be confirmed within the ES. This zone is located to the south and west of the Carbon Capture Facility, as shown in **Figure 1-3: Indicative Site Layout Plan (Volume 2)**. No new infrastructure is proposed to be located on the land within the Mitigation Area.

2.2.84. The form and function of the Mitigation Area will be refined as part of design development and will be set out in the Design Approach Document (DAD) and appropriate mitigation document. The evolving design principles are outlined within the materials produced to support the statutory consultation. The DAD will be included as part of the application for development consent.

2.3. PARAMETERS OF ENVIRONMENTAL ASSESSMENT

2.3.1. The “Rochdale Envelope” approach enables robust environmental assessment of NSIP or PNS within 'clearly defined parameters' relating to the design of the Proposed Scheme. Planning Inspectorate Advice Note Nine[11] provides guidance on the use of the Rochdale Envelope, a term used to describe those elements of the Proposed Scheme where design is yet to be finalised but can be constrained within certain parameters that are used to assess the likely significant effects on identified receptors. This approach has been used within this PEIR and will be used within the subsequent ES.

2.3.2. The Advice Note sets out that, when using the Rochdale Envelope to accommodate flexibility within an application for development consent, the Applicant should use a reasonable (or “cautious”) worst-case approach to identifying likely significant effects and should incorporate mitigation accordingly within the parameters of the Proposed Scheme being considered.

2.3.3. The parameters of assessment for the Proposed Scheme, which form the Rochdale Envelope that is being assessed, are identified in **Table 2-3** overleaf.

2.3.4. The assessments within this PEIR have been based upon a Proposed Scheme design that has been sufficiently developed to allow an assessment to be undertaken within the parameters of assessment identified in **Table 2-3**.

2.3.5. It is expected that these parameters will be further refined as part of design development. Once further refined, the parameters of assessment, together with limits of deviation (both of which will be included in the draft DCO, or documents referred to by it) will be used to ensure that potentially significant environmental effects associated with the Proposed Scheme have been adequately assessed in the EIA and the parameters of that assessment are secured.

Table 2-1: Proposed Maximum Design Parameters for the Proposed Scheme

Component / Building / Area	Maximum Number	Maximum Length (m)	Maximum Width (m)	Maximum Height (m) AOD
The Carbon Capture Facility				
Direct Contact Cooler	2	20	20	35
Absorber Column (inclusive of stacks)	2	20	20	113
Regenerator Column	2	15	15	55
CO_2 Compression Plant	2	40	40	30
CO_2 Dehydration Plant	2	50	30	30
CO_2 Liquefaction Plant	2	40	30	30
CO_2 Refrigeration Plant	2	40	20	30
CO_2 Storage (onsite)	1	100	100	80
Supported CO_2 Vent	2	10	10	45
Wet-dry Cooling Tower	1	100	60	55
Solvent Storage	2	80	20	30
Water Treatment Plant and Wastewater Treatment Plant Building	1	60	30	25
Back Pressure Turbine	2	30	30	40
Pressure Reducing De-superheating Station	2	25	15	12
Control Room and Welfare Facilities	1	50	30	12
132kV Switchroom and Transformers	1	35	35	12

Component / Building / Area	Maximum Number	Maximum Length (m)	Maximum Width (m)	Maximum Height (m) AOD
The Proposed Jetty				
Berth Pocket	1	290*	55	-10.50m Chart Datum (CD)**
Loading Platform	1	40	50	10.86m CD
Breasting Dolphins	2	n/a	n/a	10.86m CD
Mooring Dolphins	6	7	7	10.86m CD
Access Trestle	1	335	10	varies
Note: * Value averaged considering two largest dimensions. **** Dredging elevation.**				

2.4. CONSTRUCTION

INDICATIVE CONSTRUCTION PROGRAMME

2.4.1. Construction for the Proposed Scheme is expected to start in 2026.

2.4.2. Two construction options are being considered as part of the design development in respect of built development:

- Option 1 – Two-Phase Construction: First, one Carbon Capture Plant and CO_2 Compression, Conditioning and Liquefaction Plant is constructed along with the CO_2 Temporary Storage and Loading System, the Supporting Plant, Proposed Jetty, and Auxiliary Infrastructure. Then the second Carbon Capture Plant and CO_2 Compression, Conditioning and Liquefaction Plant is constructed sequentially.
- Option 2 – Single-Phase Construction: All elements of the Carbon Capture Facility, the Proposed Jetty and the Ancillary Infrastructure are constructed in parallel.

2.4.3. Further information on the two construction options is presented in **Section 3.4** of **Chapter 3: Consideration of Alternatives (Volume 1)**.

2.4.4. The construction duration is estimated to be 60 months for Option 1 (two-phase construction) and 45 months for Option 2 (single-phase construction).

2.4.5. Both of the options being progressed as part of the design of the Proposed Scheme.

2.4.6. **Table 2-2** below shows a preliminary construction programme for Option 1 and **Table 2-3** shows a preliminary construction programme for Option 2.

2.4.7. Preliminary construction programmes have been prepared on the basis of two Carbon Capture Plants as this is a worst-case in terms of construction duration, and construction traffic.

2.4.8. Each technical chapter of this PEIR has assessed the worst-case preliminary construction programme for each discipline.

Table 2-2: Preliminary Construction Programme – Option 1 (Phased Construction)

	2026				2027				2028				2029				2030			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Proposed Scheme Wide																				
Mobilisation																				
Site Preparation and Clearance																				
Groundworks																				
Mitigation Area																				
Carbon Capture Plant 1, CO_2 Compression, Conditioning and Liquefaction Plant 1, CO_2 Temporary Storage and Loading System, Supporting Plant and Ancillary Infrastructure																				
Civil Works																				
Installation Works																				
Commissioning																				
Proposed Jetty																				
Demolition Belvedere Power Station Jetty (disused)																				
Dredging																				

	2026				2027				2028				2029				2030			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Proposed Jetty Construction																				
Commissioning																				
Carbon Capture Plant 2 and CO_2 Compression, Conditioning and Liquefaction Plant 2																				
Civil Works																				
Installation Works																				
Commissioning																				

Table 2-3: Preliminary Construction Programme – Option 2 (Parallel Construction)

	2026				2027				2028				2029				2030			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Proposed Scheme Wide																				
Mobilisation																				
Site Preparation and Clearance																				
Groundworks																				
Mitigation Area																				
Carbon Capture Plants 1 and 2, CO_2 Compression, Conditioning and Liquefaction Plants 1 and 2, CO_2 Temporary Storage and Loading System, Supporting Plant and Ancillary Infrastructure																				
Civil Works																				
Installation Works																				
Commissioning																				
Marine Works																				
Demolition of the Belvedere Power Station Jetty (disused)																				
Dredging																				
Proposed Jetty Construction																				
Commissioning																				

CONSTRUCTION STAFF

2.4.9. It is estimated that a peak workforce of approximately 1,200 workers will be required for construction of the Proposed Scheme. The peak workforce requirement is associated with Option 2 (parallel construction) as this would require a more intensive resource requirement due to the shorter construction programme and so has been used as the basis of 'worst-case' assessment. The beneficial effects associated with employed generation during the construction phase are assessed and presented in **Chapter 15: Socio-economics (Volume 1)**.

CONSTRUCTION WORKING HOURS

Landside

2.4.10. During construction, it is expected that core working hours for the landside activities (Carbon Capture Facility, Ancillary Infrastructure and Mitigation Area) will be Monday to Friday 07:00 to 19:00. On Saturdays, standard working hours will be 07:00 to 13:00. It is not expected that construction work will be undertaken on Sundays or Bank Holidays. However, the majority of noisy works (i.e., those audible at the façade of residential premises) will be undertaken during the hours of 08:00 to 18:00 hours Mondays to Fridays and 08:00 to 13:00 hours on Saturdays with no noisy works on Sundays/Public Holidays.

2.4.11. Deviations to the core working hours may be required for some activities and these must be agreed with LBB.

Marine

2.4.12. Marine construction activities (Proposed Jetty) will be in a tidal environment and therefore could take place 24 hours a day and 7 days a week.

TEMPORARY CONSTRUCTION COMPOUNDS

2.4.13. Whilst construction activities will take place across the Site, two core Temporary Construction Compounds will be required, with land allocated within the Site as shown on **Figure 1-3: Indicative Site Layout (Volume 2)**. These areas will be used during construction for uses including but not limited to, construction activities, offices, warehouses, workshops, open air storage and car parking.

2.4.14. One temporary construction compound will be located across the Munster Joinery and Gannon land parcels. It is likely that the existing foundation slab will be used as the construction laydown and that the existing services onsite (drainage, power supply, potable water) will be utilised for the site offices. There is an existing access from Norman Road.

2.4.15. The second temporary construction compound will be located within the Borax South land parcel, to be used for the storage of plant and materials. There is an existing temporary access from Norman Road into this land parcel associated with the construction of Riverside 2. Appropriate access arrangements will be developed and included within the application for development consent.

2.4.16. Once construction is complete, the Temporary Construction Compounds will be utilised as part of the Carbon Capture Facility.

CONSTRUCTION DELIVERY AND ACCESS

2.4.17. Assumptions for the transport of construction plant and materials of the Proposed Scheme differ across landside and marine elements.

2.4.18. For the landside elements (Carbon Capture Facility, Ancillary Infrastructure and Mitigation Area) transport will primarily be road-based. Estimates of the vehicle movements and likely routing are detailed in **Chapter 18: Landside Transport (Volume 1)**.

2.4.19. Middleton Jetty is used by the Applicant for waste deliveries and IBA export, to and from Riverside 1, operations that will intensify with Riverside 2 commencing operation. It is not practicable to use Middleton Jetty for the delivery of construction plant and materials for the landside elements of the Proposed Scheme without compromising the effectiveness of the operations at Riverside 1 and Riverside 2 (once operational).

2.4.20. For the Proposed Jetty (i.e., steel piles, precast concrete units and marine equipment such as fenders) transport will primarily be via the River Thames.

2.4.21. The plant and materials brought in for the construction of the Proposed Jetty will be limited to the material quantities needed for construction activities being undertaken at that time, and which are designed to be constructed within the River Thames. Where appropriate, plant and materials may be temporarily stored on a jack-up barge.

2.4.22. There may be several vessel movements to and from the Proposed Jetty zone per day during the construction phase. The number of vessel movements will depend on the construction activities being undertaken at that point in time. The vessels will berth alongside the jack-up barge which will be located in close proximity to the construction activities being undertaken, moving with the Proposed Jetty zone as appropriate.

2.4.23. A safety vessel will be present when construction activities for the Proposed Jetty are underway.

2.4.24. Additionally, vessels will be required for capital dredging. Capital dredging will not be undertaken simultaneously with the Proposed Jetty construction. Further information on capital degrading is provided below.

2.4.25. Indicative construction vessel movements will be presented in the ES.

CAPITAL DREDGING

2.4.26. To ensure that vessels can berth, capital dredging of the berth pocket will be required prior to the construction of the Proposed Jetty; the volume of dredging is related to the location of the Proposed Jetty.

2.4.27. As described in **Chapter 3: Consideration of Alternatives (Volume 1)** the preferred position for the location of the Proposed Jetty is either Option 2 (furthest into the channel of the River Thames) or Option 3 (halfway between Option 1 and 2 positions).

2.4.28. The capital dredge volume for Option 3 is approximately 180,000m^3, three times higher than Option 2, and as such Option 3 has been assessed within this PEIR as it is representative of the worst-case scenario for capital dredging.

2.4.29. One or a combination of the following dredging methods will be adopted:

- Water Injection Dredging (WID) – whereby large volumes of water are injected from a horizontal jetbar to spray water at low pressure into the sediment layer. The fluidized sediment layer is then transported in the lower part of the water column away from the dredged areas.
- Trail Suction Hopper Dredging – whereby a vessel moves back and forth over the desired dredging area, with a tube trailing behind which rests on the bed. A pump sucks material and water up through the tube into the vessel, where the dredged material is stored in a hopper, and water is discharged overboard.
- Backhoe Dredging: The simplest of the three techniques, whereby an excavator mounted on the edge of a floating pontoon or barge is utilised, which reaches into the water and scoops bed material out. A separate vessel or barge will be moored alongside, which the dredged material is deposited directly into.

2.4.30. The dredged arisings will be managed in accordance with relevant legislation and may be disposed of offsite (via road or to an offshore location) if deemed unsuitable for re-use. It is anticipated that the disposal method of dredged arisings shall be described and assessed within the ES.

CONSTRUCTION LIGHTING

2.4.31. During construction, temporary artificial lighting will be used to provide a safe working site during hours of darkness. The appointed contractors will follow relevant legislation and guidance to ensure potential adverse effects from temporary artificial lighting required are minimised.

2.4.32. The principles for ensuring appropriate use of lighting during the construction phase will be set out in the Outline Code of Construction Practice (OCoCP), which is anticipated to be submitted as part of the application for development consent.

OUTLINE CODE OF CONSTRUCTION PRACTICE (OCOCP)

2.4.33. Mitigation measures to minimise potential effects such as noise, vibration and disturbance to terrestrial and marine receptors will be recorded in an OCoCP to be submitted as part of the application for development consent. The OCoCP will include mitigation measures associated with piling.

2.4.34. The OCoCP will be the mechanism that ensures the successful management of the likely environmental effects resulting from construction activities. A Framework Construction Traffic Management Plan (FCTMP) will also be submitted with the application for development consent.

2.4.35. A draft DCO requirement will ensure that the measures identified to mitigate the effects of the construction phase are included in a full CoCP, to be prepared for the Proposed Scheme by the Contractor(s) prior to the construction phase commencing. The full CoCP will detail the environmental controls, environmental protection measures and safety procedures that will be adopted during the construction phase. A full CTMP detailing the traffic management procedures to be put in place during the construction phase will also be prepared prior to the construction phase commencing. The full CoCP and CTMP, as submitted under the requirement, will likely need to be approved by LBB, as the relevant planning authority (and highway authority) before construction can commence.

2.5. DEMOLITION

MUNSTER JOINERY

2.5.1. The Proposed Scheme includes construction on the existing Munster Joinery land parcel. Munster Joinery utilises a portal frame steel structured building, with metal cladding on the walls and roofing. The building sits upon an existing foundation slab with boundary palisade fencing.

2.5.2. The Munster Joinery land parcel is proposed as one of the Temporary Construction Compounds, shown on **Figure 1-3: Indicative Site Layout Plan (Volume 2)**. Once construction is complete, the Munster Joinery land parcel will be utilised as part of the Proposed Scheme, in particular the Carbon Capture Facility. The demolition and relocation of Munster Joinery is therefore likely to be required. The demolition of Munster Joinery would represent a worst-case scenario and the Applicant would seek to relocate the business where possible.

BELVEDERE POWER STATION JETTY (DISUSED)

2.5.3. The Proposed Scheme is likely to involve some level of demolition of the decommissioned Belvedere Power Station Jetty (disused) which falls within the Proposed Jetty zone. The Belvedere Power Station Jetty (disused) is a 180m long open pile structure with a concrete deck and an open pile dolphin on each end.

2.5.4. Demolition of the Belvedere Power Station Jetty (disused) would be undertaken either manually or mechanically using hydraulic equipment. All concrete will be crushed into rubble and potentially re-used within the Proposed Scheme. Piles will either be removed entirely or cut down to towards the bed level. Further information on materials likely to be used and waste generated is provided in **Chapter 16: Materials and Waste (Volume 1)** of this PEIR.

2.5.5. It is possible at this stage that the Applicant may choose to retain the Belvedere Power Station Jetty (disused); this will be determined as part of the ongoing design development. Each of the technical chapters of this PEIR have assessed the demolition of the Belvedere Power Station Jetty (disused) and acknowledged any difference in effects should it be retained.

2.6. OPERATION AND MAINTENANCE

RIVERSIDE 1 AND RIVERSIDE 2 INTERFACE

2.6.1. Riverside 1 and Riverside 2 are both located within the Site as the Proposed Scheme will need to be physically integrated with these two facilities. The key interfaces are:

- flue gas supply – flue gas is to be routed from both Riverside 1 and Riverside 2 to the Carbon Capture Facility;
- steam supply – modifications to Riverside 1 and Riverside 2 will be required to supply steam to the Carbon Capture Facility; and
- electrical supply – electrical connections will be made to transfer electricity generated by Riverside 1 and Riverside 2 to the Carbon Capture Facility, the Proposed Jetty, and the ancillary infrastructure.

2.6.2. The supply of steam to the Carbon Capture Plants will reduce the amount available to drive the steam turbines of the EfW facilities, decreasing their power generation. The Carbon Capture Facility will also add parasitic load. Consequently, the supply of steam and power to the Proposed Scheme will reduce the amount of electricity exported from Riverside 1 and Riverside 2. Quantification of this will be presented within the ES. For the purposes of this PEIR and the assessment presented within **Chapter 13: Greenhouse Gases (Volume 1)** reasonable assumptions have been made.

2.6.3. The quantities of waste received by Riverside 1 and Riverside 2 (once operational) will not change as a consequence of the Proposed Scheme.

OPERATION LIGHTING

2.6.4. External lighting is used for Riverside 1 and is under construction for Riverside 2.

2.6.5. During operation, external artificial lighting will be required to ensure safe and secure use of the Proposed Scheme, see **Paragraph 2.2.78**. An Outline Lighting Strategy will be developed in accordance with relevant legislation and guidance in order to minimise effects from light intrusion, sky glow or glare to be developed and submitted as part of the application for development consent. Any new lighting is likely to comply with the same standards as Riverside 2.

HOURS OF WORKING

2.6.6. The Proposed Scheme will operate concurrently with Riverside 1 and Riverside 2 (once operational), which are designed for continuous operation. Therefore, other than for periods of maintenance and unplanned shutdowns, the Carbon Capture Facility will operate continuously. Planned maintenance of the Carbon Capture Facility will coincide with planned maintenance of Riverside 1 and/or Riverside 2 requiring high numbers of contractors onsite to support the outage activities.

MAINTENANCE

2.6.7. Maintenance of the Proposed Scheme will be the responsibility of the Applicant, and will involve routine, planned maintenance and system checks, as well as reactive maintenance and repairs. A periodic maintenance dredge will be required to ensure the Proposed Jetty remains operational at all states of the tide.

2.6.8. Major routine and planned maintenance of the Proposed Scheme will be aligned with regulatory inspection requirements and outage schedules for Riverside 1 and Riverside 2 (once operational), where practicable. This approach will minimise the number of scheduled outages and minimise the quantity of CO_2 that is emitted to the atmosphere during maintenance of the Proposed Scheme.

2.6.9. The routine and planned maintenance activities that are anticipated to be undertaken during scheduled outages will include inspections of column internals (Absorber Column, Solvent Regeneration System and Direct Contact Cooler), inspections of the Heat Exchanger (to identify corrosion and replacing oil) and inspections of the key components of the CO_2 Compression, Conditioning and Liquefaction Plants.

2.6.10. The operational procedures, including maintenance, will be set out in an Operational Environmental Management Plan (OEMP), which will be prepared prior to the Proposed Scheme commencing operation in accordance with the measures set out in the Register of Commitments. The Register of Commitments will be prepared as part of the application for development consent.

2.6.11. Procedures for the maintenance of the Mitigation Area will be set out in an Outline Landscape and Environmental Management Plan (OLEMP) (or similar type document) to be submitted with the application for development consent.

Maintenance Dredging Requirements

2.6.12. Periodic maintenance dredging will be required to ensure the Proposed Jetty remains accessible. The exact volumes and frequency of the maintenance dredging will depend on the final design of the Proposed Jetty. Further detail on the maintenance dredging required will be assessed in the ES.

OPERATION STAFF

2.6.13. During the operation phase of the Proposed Scheme a workforce of approximately 27 FTE staff are expected to be required for operation and maintenance activities. However, the administrative and human resources staff for Riverside 1 and Riverside 2 (once operational) will be shared across the Riverside Campus and as such additional administrative and human resources staff are not anticipated.

2.6.14. The beneficial effects associated with employment generation during the operation phase are assessed and presented in **Chapter 15: Socio-economics (Volume 1)**.

OPERATION VEHICLE MOVEMENTS AND ACCESS

2.6.15. As detailed in **Chapter 18: Landside Transport (Volume 1)** the Proposed Scheme will generate a small number of vehicle movements during the operation phase which, in agreement with the Planning Inspectorate and LBB, will not be scoped into the landside transport assessment. The vehicle movements will be from the following:

- operation staff travelling to / from the Proposed Scheme;
- additional contractors for maintenance activities not undertaken by the operational workforce;
- delivery of diesel for the back-up diesel generators;
- delivery of chemicals and proprietary amine-based solvent; and
- Emergency Services.

2.6.16. Access to the Site will be via Norman Road.

2.6.17. The Proposed Jetty will provide the riverside access point to be used for the export of CO_2.

OPERATION VESSEL MOVEMENTS

2.6.18. Based on a preliminary operational capacity assessment, up to five marine vessels will call at the Proposed Jetty each week to collect and transport LCO_2 to meet the annual throughput, and this forms the basis of assessments in this PEIR. The marine vessel number has been calculated on the basis of the marine vessel capacity and the anticipated weekly CO_2 capture rate of the Two-Phase Construction approach for the Carbon Capture Facility at peak capacity. It is expected that the marine vessels will have a LCO_2 capacity of approximately 7,500m^3 each.

2.6.19. In order to accommodate changes in vessel types the Proposed Jetty will be designed to accommodate marine vessels with a capacity of up to 15,000m^3 per vessel, which would then result in a lower number of calls per week than the five referenced above. There will also be up to ten tug movements from the rear of the structure of the Proposed Jetty.

HAZARD PREVENTION AND EMERGENCY PLANNING

2.6.20. The approach to the consideration of major accidents and disasters in relation to the EIA for the Proposed Scheme is described in **Chapter 20: Major Accidents and Disasters (Volume 1)**.

2.6.21. Given the Hydrogen Project is no longer part of the Proposed Scheme, it will not be regulated under the Control of Major Accident and Hazards ('COMAH') Regulations, 2015[12]. CO_2 is not currently classed as a Hazardous Substance under the COMAH Regulations and as such the Site would remain a non-COMAH site with the Proposed Scheme in place.

2.6.22. An Outline Emergency Preparedness and Response Plan (OEPRP) will be prepared and submitted alongside the application for development consent. A draft DCO requirement will ensure that the measures identified in the OEPRP are included in a full EPRP, to be prepared for the Proposed Scheme prior to the operation phase commencing.

2.7. APPROACH TO DECOMMISSIONING

2.7.1. The Proposed Scheme is intended to operate for at least 25 years. However, for the purpose of assessing a reasonable worst-case scenario it is assumed that it could have a design life of 50 years, as per typical design life of the civil and structural elements of the Proposed Scheme.

2.7.2. At the end of the 50-year period, the Proposed Scheme may have some residual life remaining, and an investment decision will be made as to whether the operational life of the Proposed Scheme is to be extended. If it is not appropriate to continue operation, the plant will be decommissioned.

2.7.3. Any decommissioning would be likely to be completed in less time than the construction of the Proposed Scheme. Whilst the Applicant has no plans to decommission and remove the Proposed Scheme, were it to be removed it would be likely to require a similar degree of plant, equipment, and disturbance to that predicted during construction. It is considered that the potential sensitivity of receptors during decommissioning are likely to be similar to those during construction but with a lower magnitude of impact due to the shorter timeframe associated with any decommissioning.

2.7.4. **Table 2-4** describes, at a high-level, by technical topic, why there are unlikely to be any new or different significant effects during decommissioning than those identified during construction in **Chapter 5: Air Quality (Volume 1)** to **Chapter 21: Cumulative Effects (Volume 1)**. In many cases the effects are likely to be of a lower significance than construction due to the anticipated lower magnitude of effects anticipated during decommissioning. **Table 2-4** has been prepared based on the mitigation measures outlined throughout this PEIR.

2.7.5. In light of this and given that the Applicant has no plans to decommission the Proposed Scheme, further consideration of decommissioning is not considered appropriate. A Demolition Environmental Management Plan (DEMP) will be prepared in advance of decommissioning commencing, as will be required by the DCO.

Table 2-4: High-level Decommissioning Appraisal

Topic	Summary of Appraisal
Air Quality	Emissions to air may be generated by decommissioning activities such as vehicle exhausts and generators. However, at a time when decommissioning takes place (in at least 50 years) it is likely that improvements would have been made to vehicles and machinery to reduce air quality emissions generated. There may also be dust arising. However, these effects would be managed by standard good practice measures applied at the time and pursuant to the DEMP. Therefore, there are unlikely to be significant effects on air quality during decommissioning.
Noise and Vibration	The activities required during decommissioning, such as demolition of the Carbon Capture Facility, Proposed Jetty and Ancillary Infrastructure could generate noise for short periods of time at a local level. However, this is unlikely to exceed the noise levels assessed within the construction phase. In addition, at a time when decommissioning takes place (in at least 50 years) it is likely that improvements would have been made to vehicles and machinery to reduce noise generation. If noise levels exceed thresholds, it is assumed that best practicable means would be employed, including selecting low noise/vibration equipment and methodologies, pursuant to a DEMP. Therefore, there

Topic	Summary of Appraisal
	are unlikely to be significant effects on noise and vibration during decommissioning.
Terrestrial Biodiversity	The footprint of any decommissioning works is likely to be smaller than the ground disturbed during construction of the Proposed Scheme and the effects would be no worse than those identified during construction. There could be effects to protected species and habitats at the time of decommissioning, including through light impacts. However, these are likely to be managed through standard good practice measures and/or the measures set out in the relevant consents at the time, for example, European Protected Species licences for foraging bats present in the Crossness LNR. Therefore, there are unlikely to be any significant effects to terrestrial biodiversity during decommissioning.
Marine Biodiversity	The footprint of any decommissioning works is likely to be smaller than the ground disturbed during construction of the Proposed Scheme and the effects would be no worse than those identified during construction. There could be effects to protected species and habitats at the time of decommissioning, however these are likely to be managed through standard good practice measures and/or the measures set out in the relevant consents at the time. Therefore, there are unlikely to be any significant effects to marine biodiversity during decommissioning. Additionally, full demolition would increase the availability of intertidal mudflat habitat that was previously lost to construct the Proposed Jetty. Should the intertidal mudflat return to pre-existing conditions, the temporary adverse effects to marine biodiversity through decommissioning are unlikely to significantly outweigh the long-lasting benefit of habitat restoration.
Historic Environment	The footprint of any decommissioning works is likely to be smaller than the ground disturbed during construction of the Proposed Scheme. As the ground within this area would already have been disturbed during construction, it is unlikely that archaeological remains would be present. Therefore, there are unlikely to be any significant effects to archaeology during decommissioning. Removal of the Carbon Capture Facility, Proposed Jetty and Ancillary Infrastructure could have beneficial effects on heritage assets through the removal of modern development within their setting. However, these are unlikely to be significant, given the conclusions of the assessment in this PEIR. There is the potential for decommissioning works to have a temporary adverse effect on heritage assets through the introduction of noise and

Topic	Summary of Appraisal
	visual intrusion within their setting during construction. However, this would be temporary and is unlikely to be significant.
Townscape and Visual	The demolition of the Carbon Capture Facility, Proposed Jetty and Ancillary Infrastructure could have beneficial effects on views and the landscape character of the area. There would be decommissioning vehicles present within the landscape and views, but these would be temporary and transient throughout the Site. However, these effects are not likely to be different or worse than those presented in **Chapter 10: Townscape and Visual (Volume 1)**.
Water Environment and Flood Risk	There is the potential for short-term temporary effects to watercourses (e.g., pollution risks) and land drainage during decommissioning. However, these effects would be managed by standard good practice measures applied at the time, pursuant to a DEMP. Therefore, there are unlikely to be any significant effects to the water environment during decommissioning. Under decommissioning, the removal of impermeable surfaces at the Site may be beneficial to the areas overall flood risk.
Climate Resilience	The activities required during decommissioning may be subject to temporary adverse effects as a result of climate variables including extreme precipitation events (flooding), extreme temperature events and high winds and storms. Such events will cause temporary disruption to decommissioning activities. Measures including drainage and the use of silt traps will ensure that these climate variables are unlikely to have a significant adverse effect. At a time when decommissioning takes place (in at least 50 years) similar adverse effects would arise (or indeed could be improved given expected developments in technology over time) given design optimisation is expected to maximise resilience.
GHG	Considering decommissioning of the Proposed Scheme in isolation would likely require a similar degree of plant, equipment, and disturbance to that predicted during construction. Similar effects would arise (or indeed could be improved given expected developments in technology over time) given design optimisation to minimise emissions to reflect the carbon reduction hierarchy as well as other measures. Given that the Proposed Scheme is expected to result in a substantial decrease in GHG emissions compared to the baseline scenario, decommissioning will likely result in adverse effects to the quantity of emissions, should Riverside 1 and Riverside 2 remain operational without the Proposed Scheme in place (capturing the CO_2).

Topic	Summary of Appraisal
Population, Health and Land Use	As decommissioning work is not permanent the effects from decommissioning activities will be temporary and short-term in nature, having limited effects on surrounding sensitive receptors. Walkers and cyclists making use of routes through the Site will be temporarily disrupted by decommissioning activities. However, the public would be informed of the nature, timing and duration of works and provided with appropriate alternative diversion routes with clear signage and directions pursuant to a DEMP. Therefore, effects to these receptors are not expected to be significant. Noise and air pollution are likely to be generated as a result of decommissioning activities, though these effects would be managed by standard good practice measures and best practicable means. Therefore, these effects are unlikely to be significant.
Socio-economics	Decommissioning employment represents a positive economic effect that can be estimated as a function of the scale and type of activities required. The permanent loss of operational employment is not expected to have significant effects to the local economy. Post-decommissioning, the Site will be available for new businesses to move in.
Materials and Waste	Decommissioning activities will follow best practice construction methods to minimise as far as possible impacts from the demolition of construction materials, pursuant to a DEMP. This includes the view to maximise the potential for re-use and recycling of materials/elements at the end-of-life stage. Any unsalvageable elements of the Proposed Scheme would contribute to waste generation. Waste generation is unlikely to exceed that of initial construction activities. Therefore, there are unlikely to be significant effects on materials and waste during decommissioning.
Ground Conditions and Soils	There is the potential for short-term temporary effects to ground conditions (e.g., potential for contaminated land) during decommissioning. However, these effects would be managed by standard good practice measures applied at the time. Therefore, there are unlikely to be any significant effects on the geology of the area during decommissioning.
Landside Transport	Decommissioning activities will likely result in temporary cyclist and pedestrian severance and subsequent delay. Surrounding public transport networks may also experience slight disruption resulting from decommissioning. As a result of the short-term nature of decommissioning activities, these delays are not expected to be

Topic	Summary of Appraisal
	experienced for a prolonged period of time, and so any adverse effect is not expected to be significant.
Marine Navigation	During the decommissioning of the Proposed Jetty, it is likely that similar vessel movements and activities within the River Thames will be required as those required for the construction of the Proposed Jetty and these effects are not anticipated to be significant. Once the decommissioning of the Proposed Jetty is complete this would likely result in eased marine congestion. Additionally, where the Proposed Jetty constituted a contact hazard for existing operations, alternative ships and tankers will no longer need to consider the potential negative effects of the Proposed Jetty. Therefore, decommissioning activities, once complete, are expected to have beneficial effects for marine navigation.
Major Accidents and Disasters	Decommissioning activities will proceed in accordance with standard health and safety systems and risk management systems as utilised throughout construction. As a result, the risk of adverse effects on major accidents and disaster during this decommissioning are expected to be minimal.
Cumulative Effects	The intra-project cumulative effects would depend on the potential effects identified from the different aspects at the time. However, it is unlikely that the effects would be different to those identified during construction and therefore there would be no new or different significant effects for the decommissioning phase when compared to construction of the Proposed Scheme. The inter-project cumulative effects assessment would depend on the proposed other developments within the vicinity at the time of decommissioning. Therefore, an assessment of inter-project cumulative effects is not possible at the current time.

2.8. DESIGN ASSUMPTIONS

2.8.1. The following assumptions apply to the design of the Proposed Scheme:

- It is recognised that the management framework for the Proposed Scheme is not fully defined at this stage. However, a presumption of standard practice and regulatory compliance within the adopted management framework has been assumed and will be developed following the appointment of the Contractor(s).
- The design, installation, commissioning, operation and maintenance of plant, drainage systems, equipment and machinery, including associated systems, will take into account good engineering practice.
- In accordance with good safety management principles, it has been assumed that all risks that have the potential to be major accidents or disasters, and could impact a local environmental receptor, would be managed using the As Low As Reasonably Practicable (ALARP) principle.

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CORY

DECARBONISATION

CHAPTER 3: CONSIDERATION OF ALTERNATIVES

Cory Decarbonisation Project

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3. CONSIDERATION OF ALTERNATIVES

3.1. INTRODUCTION

3.1.1. This chapter sets out the preliminary consideration of alternatives in accordance with Regulation 14(2)(d) of the EIA Regulations[1] which states that an environmental statement should contain:

"A description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment."

3.1.2. Whilst this is a preliminary environmental information report, rather than an environmental statement, it is considered best practice, in accordance with Planning Inspectorate Advice Note 7, to include information on alternatives in this report to assist the consultation bodies to develop an informed view of the Proposed Scheme.

3.1.3. The Proposed Scheme has evolved in its design. The following alternatives have been considered and are set out in the following sections below:

- The 'Do Nothing' Scenario (**Section 3.2**);
- Alternative Development Areas (**Section 3.3**);
- Alternative layouts (**Section 3.4**);
- Alternative technologies (**Section 3.5**);
- Alternative water supply and discharge (**Section 3.6**);
- Alternative transport routes (**Section 3.7**);
- Alternative vessel routes (**Section 3.8**); and
- Alternative construction compound areas (**Section 3.9**).

3.1.4. The current, though still evolving, design of the Proposed Scheme is detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**. Options that have been considered and discounted are described within this chapter.

3.1.5. Further to **Chapter 1: Introduction (Volume 1)** the Hydrogen Project and the battery energy storage system, as identified in the Scoping Report[2] are no longer a part of the evolving design. Neither the Hydrogen Project nor the battery energy storage system will be considered as part of the Proposed Scheme.

3.2. DO NOTHING SCENARIO

3.2.1. The 'Do Nothing' scenario is the continued operation of Riverside 1 and Riverside 2 (when constructed and operational) without the addition of carbon capture technology. At the time of writing, construction works for Riverside 2 are being undertaken.

3.2.2. The generation of electricity through the combustion of residual municipal waste using Riverside 1 and Riverside 2 will generate up to 1.5 million tonnes per annum of CO_2. The addition of carbon capture technology would avoid at least 95% of these CO_2 emissions entering the atmosphere and is therefore preferable from a CO_2 reduction perspective.

3.2.3. The 'Do Nothing' scenario would be contrary to the UK's commitment to achieve net zero carbon emissions by 2050[3]. Consequently, it is not considered further.

3.2.4. The 'Do Nothing' scenario would also be contrary to existing and emerging NPS EN-1[4] and NPS EN-3[5], which establish the need for new nationally significant infrastructure delivering the need for more electricity capacity to meet future increases in demand, and which includes carbon reduction strategies. Relevant to this option is the specific policy context given to carbon capture in the emerging NPS; a notable change from the existing NPS. Further information on the need for the Proposed Scheme is provided in **Section 1.2** of **Chapter 1: Introduction (Volume 1)**.

3.3. ALTERNATIVE DEVELOPMENT AREAS

3.3.1. Numerous options for parcels that could be utilised for development in and around Riverside 1 and Riverside 2 were considered to identify the preferred combination of Development Area(s) for the Carbon Capture Facility and Development Option for the Proposed Jetty.

3.3.2. Key to the identification of Development Area Options for the Carbon Capture Facility was the need:

- to provide sufficient land available to house all of the aspects of the Carbon Capture Facility as described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, based on a footprint of approximately 7 hectares; and
- to utilise land located within close proximity to Riverside 1 and Riverside 2, to facilitate the routing of the flue gas from the respective flue gas stacks to the Carbon Capture Facility.

3.3.3. Engineering, environment (including impacts to Crossness LNR and to MOL), planning (including impacts to third party land) and cost factors were considered in order to select the preferred Development Area option, based on professional judgement.

THE CARBON CAPTURE FACILITY

3.3.4. Nine Development Area Options (eight land based and one within the River Thames) were identified for the Carbon Capture Facility.

3.3.5. The Development Area Options considered for the Carbon Capture Facility are described in **Table 3-1** and the locations of the Development Area Options are shown on **Figure 3-1: Alternative Development Area Options for the Carbon Capture Facility (Volume 2)**. Each of the land parcels described in the description column of **Table 3-1** are shown on **Figure 1-2: Satellite Imagery of the Site Boundary Plan (Volume 2)**.

Table 3-1: Alternative Development Areas for the Carbon Capture Facility

Development Area	Description
A	Option A comprises brownfield, open grassland, ditches and an access road. The Option includes a part of Borax North, with all of Borax South, and Creekside. It is crossed by the Thames Water Access Road.
B	Option B comprises largely of open grassland. The northern section of is part of Crossness LNR land, and the southern section comprises Borax North and Borax South. It is dissected by the Thames Water Access Road.
C	Option C comprises a disused sludge incinerator and the Great Breach Pond.
D	Option D comprises brownfield, hardstanding and grassland. The area consists of three separate land parcels, Creekside, Munster Joinery (an operating business) and Gannon.
E	Option E comprises the Iron Mountain Records Storage Facility (an operating business).
F	Option F is the location of a Lidl Warehouse/ Belvedere Regional Distribution Centre (an operating business).
G	This option comprises the intertidal zone of the River Thames, to the north of the of the Iron Mountain Records Storage Facility, where the current Belvedere Power Station Jetty (disused) is located. This option would require the creation of a land within the intertidal zone.
H	This option is located immediately south of Riverside 1 and Riverside 2, within land known as the Eastern Paddock and Western Paddock.
I	Option I consist of a land parcel adjacent to Riverside 2 which includes the Great Breach Pumping Station. It comprises Crossness LNR land and Erith Marshes SINC land.

Chosen Carbon Capture Development Areas

3.3.6. Development Area Options A, B, D and H were selected for the following reasons:

- to form a single homogenous area with sufficient space for the necessary footprint of the Carbon Capture Facility;
- close proximity to Riverside 1 and Riverside 2 for connection of the flue gas ducting and further utilities;
- the ability to consolidate the direct loss of Crossness LNR land, Erith Marshes SINC land and land designated as MOL; and
- avoiding adverse environmental impacts associated with works within the River Thames above and beyond those required for the Proposed Jetty.

3.3.7. As discussed below, further design development is on-going in relation to the design layout of the Proposed Scheme within these parcels. Further information on the completed optioneering processes for the Carbon Capture Facility as a whole will be presented in the ES and the Design Approach Document submitted with the application for development consent.

THE PROPOSED JETTY

3.3.8. Four Development Options were identified for the Proposed Jetty. The Development Options considered for the Proposed Jetty are described in **Table 3-2**. The location of the Development Options for the Proposed Jetty is shown on **Figure 3-2: Alternative Development Area Options for the Proposed Jetty (Volume 2)**.

Table 3-2: Alternative Development Options for the Proposed Jetty

Development Option	Description
A	This option is located to the north of the Iron Mountain Records Storage Facility, adjacent to the Belvedere Power Station Jetty (disused) and could involve the replacement of the Belvedere Power Station Jetty (disused).
B	Option B involves an extension to both ends of the existing Middleton Jetty, which is actively used as part of Cory's existing operations on the River Thames.
C	Option C involves the construction of a new jetty structure immediately upstream and in-line with the Middleton Jetty.
D	Option D involves the demolition and reconstruction of the Thames Water Jetty.

Chosen Proposed Jetty Area

3.3.9. Development Option B was discounted because the construction works to the existing Middleton Jetty would have an adverse impact on the Applicant's operations at Riverside 1 (and in time Riverside 2).

3.3.10. Development Option C was discounted because the construction works, and the future operation of the Proposed Jetty would have an adverse impact on the Applicant's operations at Riverside 1 (and in time Riverside 2). In addition to this:

- locating the Proposed Jetty between the Thames Water Jetty and Middleton Jetty could interfere with approach of the barges' arrival at Middleton Jetty; and
- a large amount of dredging would be required in order to create a berth pocket for a suitable vessel.

3.3.11. It was considered that Development Option D had insufficient space to accommodate the necessary infrastructure landside, with only a small corridor connecting to the Carbon Capture Facility.

3.3.12. Development Option A was selected as the preferred Development Option as the previous use of this as the Belvedere Power Station Jetty (disused) means there are limited impacts on current maritime operations and minimal engineering constraints.

SUMMARY OF THE CHOSEN PROPOSED SCHEME AREAS

3.3.13. The selection of Development Area Options for the Carbon Capture Facility and for the Proposed Jetty was undertaken in parallel. It was acknowledged that for the majority of the Development Area Options for the Carbon Capture Facility, there is a clear jetty preference in terms of routing to the Proposed Jetty.

3.3.14. In the selection of the Development Area Options for the Carbon Capture Facility (Options A, B, D and H) it was ensured that the optimum Proposed Jetty Development Option (Option A) would work in alignment with the preferred Development Area Options for the Carbon Capture Facility. Together these options were taken forwards to shape the evolving design of the Proposed Scheme.

3.4. ALTERNATIVE LAYOUTS

3.4.1. Following selection of the preferred Development Areas, alternative site layouts were developed, for both the Carbon Capture Facility and the Proposed Jetty. Due consideration was given to the technical, environmental, cost and planning elements of each alternative to identify the preferred layout for each of the Carbon Capture Facility and the Proposed Jetty.

THE CARBON CAPTURE FACILITY

Plant Layouts

3.4.2. The required plant for the Carbon Capture Facility is described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

3.4.3. Consideration was given to locating LCO_2 Temporary Storage to the north of the Site, to be closer to the Proposed Jetty. This option was not considered viable as the cost and process benefit of reducing the length of the interconnecting ductwork (steam, condensate, flue gas) between the Riverside 1 and Riverside 2 facilities and the Carbon Capture Facility is much greater than reducing the length of LCO_2 pipework from LCO_2 Temporary Storage to the Proposed Jetty. The increased LCO_2 pipework solution is more cost-effective and less technically challenging to install compared to the interconnecting ductwork. A further benefit is that the LCO_2 pipework is less obtrusive leading to potential space savings for the site.

3.4.4. Considerations of the site layout as part of the developing understanding of the baseline is on-going and will be reported in full in Chapter 3: Considerations of Alternatives of the ES and the Design Approach Document to be submitted with the application for development consent.

Phased Construction Options

3.4.5. Two construction options were considered in respect of built development:

- Option 1 – Two-Phase Construction: First, one Carbon Capture Plant and CO_2 Compression, Conditioning and Liquefaction Plant is constructed along with the LCO_2 Temporary Storage and Loading System, the Supporting Plant, Proposed Jetty, and Auxiliary Infrastructure. Then the second Carbon Capture Plant and CO_2 Compression, Conditioning and Liquefaction Plant is constructed sequentially.
- Option 2 – Single-Phase Construction: All elements of the Carbon Capture Facility, the Proposed Jetty and the Ancillary Infrastructure are constructed in parallel.

3.4.6. A Single-Phase Construction benefits from having a lower capital expenditure (CAPEX) and likely reduced footprint whereas a two-phase construction provides operational flexibility and the option of a phased development approach. A two-phase construction spreads investment in the Proposed Scheme over a longer period and would enable the lessons learned as part of construction and commissioning of the first Carbon Capture Plant to be incorporated as part of the construction and commissioning of the second Carbon Capture Plant. This has the added benefit of enabling CO_2 to be captured earlier, albeit at reduced quantities, prior to the second Carbon Capture Plant coming forward. However, the downsides of such an approach are the requirement to construct the second Carbon Capture Plant alongside the first, operational Carbon Capture Plant and an overall reduction in the quantity of CO_2 that is captured prior to the commencement of commercial operation of the second Carbon Capture Plant.

3.4.7. There is limited difference in the construction durations between the two Options – 60 months for Option 1 (two-phase construction) and 45 months for Option 2 (single-phase construction). With respect to Option 1, it will reduce the magnitude of construction (for example – the number of construction vehicles per day) by being over a longer period of time but increase the duration of construction activities. Conversely, the magnitude of construction traffic would be greatest as a result of the consolidated construction programme for Option 2 (single-phase) when compared to Option 1 (two-phase construction), due to the consolidation of the programme.

3.4.8. Both are continuing to be considered further in the design evolution of the Proposed Scheme.

Flue Gas Ducting Routes

3.4.9. The preferred Development Site Option is located to the south of Riverside 1 and Riverside 2. Whilst the stack for Riverside 1 is located at the south end of the building, the stack for Riverside 2 is located at the north end of the facility, adjacent the River Thames. Consequently, four different routes were considered for the flue gas ducting from Riverside 2 to the Carbon Capture Facility:

- Route Option A – south west around Riverside 2 with all of the ducting to be located within the Site;
- Route Option B – south west around Riverside 2, with a section of the ducting to be located outside the Site within Crossness LNR;
- Route Option C – north east of Riverside 1 and Riverside 2, with all of the ducting to be located within the Site; and
- Route Option D – north east of Riverside 1 and Riverside 2, running along the southern bank of the River Thames, with ducting substantially located outside of the Site.

3.4.10. The chosen route, Option B, avoids existing buried utilities on the Riverside 1 and Riverside 2 sites, avoids locating ducting onsite where it will impact existing operations and maintenance activities, does not require the location of infrastructure in a non-encroachment area (the River Thames) and avoids crossing or routeing along any public routes.

3.4.11. The stack for Riverside 1 is located at the south end of Riverside 1, consequently, connection to the Carbon Capture Facility is comparatively simple and the consideration of alternative routes was not required.

THE PROPOSED JETTY

Jetty Types

3.4.12. Three types of jetty structure have been considered:

- solid quay wall;
- solid jetty structure; and
- open pile structure.

3.4.13. A solid quay wall would require the construction of a quay and landside structure on the riverbank, alongside the England Coast Path (NCN1/FP3). This would require reclamation to form land to support the various components for the LCO_2 loading process. Given the intertidal nature of the bank of the River Thames, a large volume of dredging would be required within the intertidal zone to achieve the required berth pocket depth of approximately -10.5mCD (the current level in this area is approximately +6mCD) in addition to the encroachment associated with reclamation. It was concluded that this type of jetty is not suitable, and this option was not progressed.

3.4.14. A solid jetty structure positioned further into the River Thames was considered. This type of jetty would avoid intensive construction within the intertidal zone and dredging volumes would be reduced when compared to a solid quay wall. However, this form of construction is not well suited to support the loading of LCO_2. A solid jetty structure means that an expansive deck area would be required, resulting in a large amount of unused space, excess construction materials and unnecessarily large footprint in the River Thames. This option would also have a potentially large impact on tidal flows and sediment deposition in the area. It was concluded that this type of jetty is not suitable and was not progressed.

3.4.15. An open pile structure consisting of a main loading platform with dolphins, for berthing and mooring of vessels, is typical for liquid bulk handling operation and thus LCO_2. This type of jetty provides the infrastructure required for berthing and loading operations and has the advantage of minimal material and capital requirements compared to other jetty types. In addition, the open piles would have less impact on tidal flow and sedimentation, with reduced footprint in the River Thames. It was concluded that this type of jetty is suitable and was considered further.

Proposed Jetty Arrangement

3.4.16. Following the selection of the open pile structure jetty type, three different arrangement options were considered. Essential structural elements such as a loading platform, breasting and mooring dolphins, catwalks etc. are all required for this type of jetty, and each must conform to relevant design codes and standards in order for vessels to berth safely.

3.4.17. Relevant factors (such as the platform usage, range in dimensions of design vessels, access/navigation, landing) and site conditions (such as riverbed level) were considered to develop the jetty arrangement options:

- Option 1 – Closest to the southern bank of the River Thames;
- Option 2 – Furthest into the channel of the River Thames; and
- Option 3 – Halfway between Option 1 and 2 positions.

3.4.18. Option 1 was dismissed due to its proximity to the bank of the River Thames, which meant that portions of the required vessel berth pocket would need to be dredged within the intertidal zone.

3.4.19. Option 2 has the lowest dredging volume requirements and easiest marine access from the main channel, however it has potentially higher navigational risk when compared to Option 3.

3.4.20. Option 3 has significantly higher dredge volume requirements compared to Option 2 (approximately three times the volume), but is located nearer to the intertidal zone, reducing the navigational risk further than Option 2.

3.4.21. The Applicant is still considering the choice between Option 2 and Option 3 in light of the above, and as such both are being considered further in the design evolution of the Proposed Scheme.

Jettyless Transfer

3.4.22. An alternative method of transferring the LCO_2 from shore to vessel is to use a jettyless transfer system; a floating, manoeuvrable jetty head which can be moved between the shore and a vessel moored in the River Thames. The floating jetty head is then connected to the shore with floating pipes.

3.4.23. While this option eliminates the need for a fixed jetty structure, and its associated effects, it is not particularly well suited to support the proposed operation and particular site conditions of the Proposed Scheme. Not least, the flexible nature of the jettyless transfer system is not likely to be appropriate for the tidal patterns of the River Thames, with variations in tide levels approximately 7.5m Highest Astronomical Tide to Lowest Astronomical Tide (HAT to LAT).

3.4.24. This option does not eliminate the need for a berthing pocket for vessel access and some form of mooring structure. The floating pipes would have to cross the intertidal zone and England Coast Path (NCN Route 1/FP3). Furthermore, a structure would still be required to prevent the pipes from sitting on the bank of the River Thames in the intertidal zone, and a bridge would be required over England Coast Path (NCN Route 1/FP3).

3.4.25. The jettyless transfer system currently only has a 25-year design life, whereas the Proposed Jetty has a minimum 50-year design life.

3.4.26. The jettyless transfer system was concluded to not be appropriate and has not been considered further in the design evolution of the Proposed Scheme.

3.5. ALTERNATIVE TECHNOLOGIES

SOLVENT TYPES

3.5.1. Three liquid solvent options were considered ahead of selection of the carbon capture technology (with the provider of the technology still to be confirmed at this PEIR stage):

- Option 1 – Amine Based Solvent: Amine based solvent absorption is the industry standard technology for carbon capture, with technology vendors offering proprietary solvent systems and having examples of large-scale facilities successfully operating internationally. The solvent binds to the CO_2 and the concentration of CO_2 in the gas phase is progressively decreased as it rises through the absorber column.
- Option 2 – Chilled Ammonia Process (CAP): The CAP utilises an aqueous solution of ammonia at chilled conditions to absorb the CO_2 from the flue gas. The basic chemistry and process is much like amine-based solvents, with the captured CO_2 bonding to ammonium carbonate to form ammonium bicarbonate in the absorber column. Unlike amine based solvents, CAP is more chemically stable thus it does not produce degradation products, leading to less harmful emissions.
- Option 3 – Hot Potassium Carbonate (HPC): The HPC process involves cooling and compressing the flue gas prior to the use of the HPC solvent to capture the CO_2 from the pressurised flue gas. Compared to an amine based solvent, HPC does not produce degradation products, resulting in less harmful emissions and potassium carbonate is low-cost and freely available.

3.5.2. Option 2 (CAP) was dismissed as a potential option due to never having been proven at the scale required for the Proposed Scheme, nor has it been selected for commercial-scale projects currently under development. In comparison to amine-based technologies there was no benefit advantageous enough to justify a first-of-a-kind selection.

3.5.3. Option 1 (amine based) and Option 3 (HPC) were compared based on utilities consumption, proven track record, layout and environmental considerations such as emissions and waste produced.

3.5.4. Option 1 (amine based) produces spent liquid solvent waste, and results in amine degradation products that are emitted within the treated flue gas. The spent solvent waste is contained, stored on site then taken off site for disposal; it is not considered to present an environmental risk unless there is a loss of containment.

3.5.5. Whilst Option 3 (HPC) was preferred in terms of emissions and waste streams, it has not been proven at commercial scale in a post-combustion capture application (such as that of the Proposed Scheme), having historically been used within pre-combustion capture in hydrogen and ammonia production facilities. Option 1 (amine based) was selected due to: the number of successfully operational plants; multiple, established technology providers; and the benefit of reduced utilities consumption. The primary requirements in terms of utilities are power and steam. The diversion of steam from Riverside 1 and Riverside 2 to the Carbon Capture Facility reduces the power generated at the EfW facilities, as less steam flow would reach the steam turbine. Reducing steam and power demand from the Proposed Scheme maximises the potential for power exported to the grid and/or heat to the district heating network.

3.5.6. Air quality modelling will be undertaken to demonstrate compliance with environmental limits, particularly with regard to the amine degradation products in the flue gas for Option 1 (amine based) (further details are provided in **Chapter 5: Air Quality (Volume 1)**). Additional measures, such as acid wash or additional flue gas treatment or increase in stack height, can be implemented to manage emissions. Such measures are outlined further in **Chapter 5: Air Quality (Volume 1)** and will be discussed further in the ES, if required.

STEAM SOURCE

3.5.7. The Carbon Capture Facility requires steam; three source options were considered:

- Option 1 – Steam supply from existing Riverside 1 and Riverside 2:
  - Option 1a – extraction from the steam turbine;
  - Option 1b – redirecting the high-pressure steam line upstream of the steam turbine; and
- Option 2 – The use of an auxiliary steam boiler.

3.5.8. Option 1a, steam extraction from the respective steam turbines of Riverside 1 and Riverside 2 is not possible due to the steam conditions not being aligned to requirements on either mass, pressure, or temperature conditions for the Carbon Capture Facility.

3.5.9. Option 2, an auxiliary steam boiler was discounted because operation of the boiler would result in additional CO_2 emissions as a suitable low carbon fuel is not yet available. It would be possible to capture the CO_2 emissions from the auxiliary boiler. However, this would increase the footprint required for the Carbon Capture Facility and even at high capture rates (95%) there would still be additional emissions of CO_2.

3.5.10. Consequently, Option 1b has been selected as the preferred option with the steam required for the Carbon Capture Facility to be sourced from the high-pressure steam lines upstream of the steam turbines for Riverside 1 and Riverside 2, respectively. The steam conditions upstream of the steam turbine exceed the requirements of the Carbon Capture Facility; thus, are suitable for this use.

EMISSIONS POINT

3.5.11. Two options were considered for the optimum location for the release of flue gas from the Carbon Capture Facility:

- Option 1 – Release of flue gas from the top of the new absorbers; and
- Option 2 – Returning the flue gas through ducts back to the Riverside 1 and Riverside 2 stacks.

3.5.12. Option 1, the release of flue gas from the top of the new absorbers was the preferred option for the following reasons:

- Riverside 1 has three separate flue gas exhaust ducts, known as flues, incorporated within a single stack, and the future Riverside 2 has two separate flues leading to two separate stacks. The Riverside 1 flue gas exhaust ducts do not join up prior to the stack, and Riverside 2 has two separate stacks. Thus; five separate tie-ins, one to each flue would be required for the return of treated flue gas from the Carbon Capture Facility to the Riverside 1 and Riverside 2 stacks, increasing engineering complexity and capital costs.
- The flue gas ducting between the Carbon Capture Facility and Riverside 1 and Riverside 2 is approximately 260m and 540m, respectively. Routeing the flue gas back to Riverside 1 and Riverside 2 stacks would require routeing the flue gas ducting across long distances. This would result in higher capital costs, and a requirement for additional flue gas fans due to the pressure drop across the ducting.
- Whilst this would introduce additional stacks into the surrounding area these would be similar in nature to those associated with Riverside 1, Riverside 2 and the disused sludge incinerator and the Crossness Sewage Treatment Works, and the absorber columns as part of the Carbon Capture Facility will introduce up to two 70m high columns to the area irrespective of the selected emissions point.

3.5.13. Option 1, the release of flue gas from an additional stack on top of the absorbers that would already be approximately 70m in height, is the preferred option. Option 2 would require extensive ducting back to Riverside 1 and Riverside 2 stacks which may lead to increased visual impacts (due to the size of the ducting (approximately 3m in diameter)).

COOLING OPTION

3.5.14. There is no additional capacity within the Cooling System for either Riverside 1 or Riverside 2. Consequently, a new, standalone Cooling System will be required for the Carbon Capture Facility.

3.5.15. The following technology options were considered:

- Option 1 – Air Cooling: Using fin-fan air coolers to cool the process streams.
- Option 2 – Cooling Towers: Combining a cooling tower with a cooling water circuit, pumps and heat exchangers:
  - Option 2a – Dry Closed Circuit: no evaporative heat transfer or contact between the working fluid and air; or
  - Option 2b – Wet Open Circuit: utilises evaporative cooling to transfer heat, requiring top-up of the water loop.
- Option 3 – Wet-Dry (Hybrid) Cooling: wet open circuit cooling tower with a dry section.
- Option 4 – Once-Through Cooling: Abstraction from, and outfall to, the River Thames.

3.5.16. Option 1 was disregarded as not being a viable cooling solution. Its operation is limited by ambient temperature conditions, meaning the vendor's cooling requirements could not be met during certain weather conditions.

3.5.17. Option 2a, dry closed circuit cooling towers were found to be unsuitable, with the operation being limited by ambient temperature conditions and requiring a greater footprint in comparison to wet-dry cooling, due to having a relatively low cooling capacity per unit.

3.5.18. Option 2b, wet open circuit cooling towers, and Option 3, wet-dry cooling towers, were identified as the two technically feasible options.

3.5.19. Option 3, wet-dry (hybrid) cooling, was identified as the preferred solution as it has multiple advantages over Option 2b:

- it has a lower water consumption due to reduced evaporation losses and blowdown in the system, therefore limiting the required make-up water amount;
- it provides plume abatement as the wet air mixes with, and is heated by, the dry air prior to exiting the cooling towers, therefore negating plume visibility; and
- it provides better operational flexibility in varied environmental conditions, with the potential to use the wet section in isolation, if required.

3.5.20. Option 4 was disregarded as not being a viable cooling solution due to not being able to abstract the required high volumes of water. It was also not considered appropriate to return water to the River Thames at an elevated temperature.

CO_2 LIQUEFACTION TECHNOLOGY

3.5.21. Two options for the liquefaction of CO_2 were considered:

- Option 1 – Open-cycle Liquefaction: Where CO_2 gas is compressed then cooled, with liquefaction achieved via expansion of the gas to the two-phase region (liquid-vapour state), with expansion undertaken via control valve or turbine; and
- Option 2 – Closed-cycle Liquefaction: Where CO_2 gas is compressed then cooled via an external refrigerant loop; the refrigerant is typically ammonia or propane.

3.5.22. It is considered that Option 2, closed-cycle liquefaction, is more energy efficient than Option 1, open-cycle liquefaction. Closed-cycle liquefaction presents associated hazards; ammonia is toxic, and propane is flammable and explosive. However, the risks are understood, these being typical refrigerants used across many process plants, and subject to standard management techniques are effectively reduced to as low as is reasonably practicable ('ALARP'). Further, as the refrigerant loop is a sealed system there is a reduced risk of release to the environment. The liquefaction plant will be designed and constructed to appropriate standards, maintenance and inspection procedures will be in place and it will be operated by trained personnel.

3.5.23. The Carbon Capture Technology vendors, approached as part of the ongoing design work, have both specified closed-cycle liquefaction as the optimum approach for the required LCO_2 conditions. This verifies the performance benefit of Option 2.

CO_2 DEHYDRATION TECHNOLOGY

3.5.24. Two options for the carbon dioxide dehydration technology were considered:

- Option 1 – Solid desiccant dehydration; and
- Option 2 – Triethylene glycol ('TEG').

3.5.25. Option 1, solid desiccant dehydration uses adsorption to retain water on the surface of the desiccant particles, typically within dehydration vessels. Option 2 uses a concentrated TEG solution as the absorbing medium, capturing water particles that are subsequently removed in a regeneration unit to enable TEG reuse.

3.5.26. With Option 2, there is a risk of TEG carryover contributing an added impurity within the captured CO_2. CO_2storage cluster specifications state that a range of chemical impurities, including glycol, should be below detectable limits. On this basis, Option 1, solid desiccant dehydration was preferred.

TEMPORARY LCO_2 STORAGE WITHIN THE SITE

3.5.27. There is a requirement to temporarily store the LCO_2 onsite, prior to its export to permanent storage by ship. The LCO_2 will be stored in insulated, pressurised, above ground storage tanks. Three options have been considered for LCO_2 temporary storage, two landside and one offshore:

- Option 1 – Multiple tall vertical storage tanks located landside;
- Option 2 – Multiple spherical storage tanks located landside; and
- Option 3 – Floating offshore storage on the River Thames.

3.5.28. The key benefit of Option 1 is smaller footprint in comparison to Option 2. However, this option could introduce constructability challenges such as the ability to get tanks to site (if they are manufactured and installed in one piece) and subsequent installation in constrained area. A range of tank heights are being considered to minimise the footprint, albeit recognising that increased tank height has the potential to result in a larger visual impact.

3.5.29. Option 2, spherical storage tanks, would not be as tall as the vertical tanks being considered, thus could have a reduced visual impact. The spherical tanks require a larger footprint area in comparison to the vertical ones, which would likely impede the extent of mitigation compared to Option 1. A range of tank sizes are being considered as part of the design development.

3.5.30. Option 3, floating storage, was considered as an alternative to onshore storage given the space constraints and potential health and safety risks. While this option would take up less landside space, additional maritime works such as construction, and ongoing maintenance, dredging would be required which would increase adverse impacts to the marine environment. Option 3 would be permanently moored in the river and therefore present possible navigation risks. This option is also likely to incur additional operation costs for items such as maintenance of the floating offshore storage unit along with maintenance dredging (regular dredging of the river silt built up around the floating storage unit). This option is least preferred and has not been progressed. not progressed.

3.5.31. There is currently no clear advantage between Option 1 or Option 2 and such both are being considered further in the design evolution of the Proposed Scheme and are the subject of a question as part of this statutory consultation.

CO_2 EXPORT

3.5.32. The Proposed Scheme is not within an area with a CO_2 gathering pipeline network; export of CO_2 via pipeline is not a feasible option.

3.5.33. The captured CO_2 will be exported via one the following options:

- Option 1 – Shipping;
- Option 2 – Rail; or
- Option 3 – Road.

3.5.34. Shipping, Option 1 ,can hold a vast amount of LCO_2 and is a practical way of moving large amounts of liquid gas. The technology is proven and used in other industries safely and cost effectively. Shipping of large quantities of liquified gas is also more economically viable than other options. However, shipping can be affected by adverse weather conditions and may be subject to tidal restrictions. Another downside is the requirement for a new loading jetty to be constructed to allow berthing of the vessel.

3.5.35. Rail tankers, Option 2, can hold a larger capacity of LCO_2 in comparison to road tankers but would still be unsuitable for the large volumes to be captured by the Proposed Scheme, the number of rail tankers that would be required per day/per week would not be economic. Additionally, the Site Boundary does not contain a rail link and there is not deemed to be ample or suitable land upon which to build a loading depot on or adjacent to the chosen Site. Further, the nearest railway line is located approximately 600m south of the Site Boundary (Belvedere Railway Station), with no feasible route for a rail spur to the Carbon Capture Facility. On this basis, Option 2 was not progressed.

3.5.36. A typical LCO_2 road tanker, Option 3, has capacity of between 20 and 30 tonnes; and would therefore be inappropriate for the large volume of CO_2 to be captured by the Proposed Scheme. In addition, road export would cause extensive additional traffic movements in the local area and would need to be transported across a large distance leading to additional emissions with consequent detrimental effects. Consequently, Option 3 has been disregarded.

3.5.37. The Proposed Scheme has been progressed using shipping export, Option 1; therefore, necessitating the inclusion of the Proposed Jetty.

LCO_2 GEOLOGICAL STORAGE LOCATIONS

3.5.38. Whilst the final LCO_2 storage location does not form part of the Proposed Scheme, for the purpose of the assessment within **Chapter 13: Greenhouse Gases (Volume 1)** of this PEIR likely locations have been considered to identify the potential carbon impact of shipping.

3.5.39. Engagement with geological storage site providers is currently ongoing, taking into consideration any access restrictions to the geological storage locations. The vessel size ranges that have been considered are from 7,500m^3 to 15,000m^3 (the Proposed Jetty will be able to accommodate vessels of this size). Storage sites currently being considered are described below:

- Viking (Humber, UK) – approximately 450km shipping distance from the Site Boundary;
- Acorn (St Fergus / Peterhead, UK) – approximately 850km shipping distance from the Site Boundary;
- Bacton Thames (South East, UK) – approximately 250km shipping distance from the Site Boundary;
- Solent (Solent, UK) – approximately 350km shipping distance from the Site Boundary; and
- Storage location in North Sea – approximately 1,150km shipping distance from the Site Boundary.

3.5.40. For purposes of this PEIR the assessment within **Chapter 13: Greenhouse Gases (Volume 1)** considers the transportation of LCO_2 for the geological storage destination option that is the furthest distance from the Site (Storage location in North Sea), representative of the reasonable worst-case scenario.

Consultation with potential storage site providers is ongoing and further information will be provided to confirm the status of the end storage locations for the LCO_2 within the ES.

3.6. ALTERNATIVE WATER SUPPLY AND DISCHARGE

WATER SUPPLY

3.6.1. The Carbon Capture Facility requires water for the following elements:

- The wet-dry cooling tower system; the quality of the feed water dictates the water demand of the cooling system; and
- The wash water system of the upper section of the CO_2 absorber column, requiring a demineralised water feed. This demand is minimal compared to the demand from the cooling system.

3.6.2. The local water supply network capacity is unlikely to be able to meet the demand of the cooling system if used untreated due to the high mineral content. Dissolved minerals would need to be removed prior to use to prevent fouling and build up within equipment using it. Four approaches have been considered:

- Option 1 – Decreasing potable water usage from the cooling tower system by treating it, increasing the number of concentration cycles to reduce blowdown water volume and consequently the make-up water volume;
- Option 2 – Internal recycling of the process wastewater;
- Option 3 – Effluent supply from the nearby Crossness Sewage Treatment Works; and
- Option 4 – A new abstraction from River Thames.

3.6.3. A hybrid approach consisting of reducing demand by treating potable water (Option 1), supplemented by the internal recycling of process wastewater (Option 2) as an alternative water source is being progressed. This solution provides the best economical approach (CAPEX and operational expenditures (OPEX)) and smallest plant footprint. It also minimises wastewater generation from the Carbon Capture Facility. However, this option relies on the availability of a potable water supply from Thames Water Utilities Limited (TWUL), which is being progressed, as the existing Riverside 1 and Riverside 2 supplies will not be ample. Should the supply not (or partly not) be available, the recovery rate of the treatment plant will be optimised and/or other alternative source options will be re-evaluated. Further detail on this will be provided within the ES.

3.6.4. The use of effluent from neighbouring Crossness Sewage Treatment Works (Option 3) was considered. This option had the advantage of providing a resilient and reliable water supply with a constant water quality. However, it was discarded as a higher level of treatment would have been required for this source compared to potable water, in order to mitigate risks to public health and the process, including risks associated to pathogens. The volume of wastewater generated would be similar to that expected in the hybrid approach described above, albeit with a poorer water quality. It also would involve additional land take within Crossness LNR compared to that needed for other options.

3.6.5. The option of a new abstraction on the River Thames (Option 4) was discarded due to water quality challenges (high total suspended solids and conductivity variation associated with tidal brackish river water), leading to abstraction of high volumes of water from the River Thames. The use of this source would require either the construction of a large buffer storage tank, to reduce the impact of the daily water quality variation observed, or treatment to accommodate the observed water quality variability, which makes the operability of the treatment complex. This would also lead to a high volume of wastewater needing to be discharged (as covered within the next section Wastewater Discharge).

WASTEWATER DISCHARGE

3.6.6. The wastewater streams produced as part of the Carbon Capture Facility cannot be returned to Riverside 1 or the future Riverside 2 for disposal. The wastewater streams are: the flue gas condensate from the Direct Contact Cooler; the effluent from the CO_2 Absorber Column; the blowdown water from the cooling tower system; and wastewater form the water treatment plant. Three discharge options, five routes in total, were considered:

- Route 1 – Discharge to the local sewer (with or without treatment, depending on trade effluent consents). This is on the basis that the local sewer has sufficient capacity, and a new connection can be obtained from TWUL. Consultation is ongoing with TWUL with regards to use the use of the local sewer for wastewater discharge;
- Route 2 – Discharge into the River Thames (likely to require pre-treatment to meet discharge permit requirements) via:
  - Route 2A – a new outfall off the Proposed Jetty;
  - Route 2B – a decommissioned Belvedere Power Station outfall[a]; and
  - Route 2C – an outfall within the Crossness Sewage Treatment Works.
- Route 3 – Discharge to Great Breach Dike North Culvert (MR12)). Water from this ditch would be pumped into the River Thames via the Great Breach Pumping Station.

3.6.7. Route 2B was not considered further as it is understood that the Belvedere Power Station outfall has been decommissioned. Conveyance of the wastewater to this outfall location would involve high CAPEX to restore the outfall, when compared to the other routes.

3.6.8. Route 2C was also discarded due to high CAPEX associated with length of the pipeline and to avoid routeing through the Crossness LNR.

[a] The decommissioned power station outfall is located adjacent (north) of the Lidl Warehouse / Belvedere Regional Distribution Centre on the southern bank of the River Thames.

3.6.9. Route 3 was discarded because it is highly likely to impact the operation of the Great Breach Pumping Station and the ditch was considered unlikely to have sufficient capacity to accommodate the wastewater effluent. Consultation with the Environment Agency highlighted that the Great Breach Pumping Station does not drain under gravity due to silt affecting its operation, confirming the justification for discarding Route 3.

3.6.10. Route 1 and Route 2A are the options being progressed as part of the design of the Proposed Scheme. Route 1 is the preferred option as it involves the least engineering complexity and has the lowest CAPEX, with Route 2A being progressed in the case that feedback from TWUL indicates that Route 1 is not feasible.

3.6.11. In addition to discharging wastewater to the sewer or a watercourse, zero liquid discharge (ZLD) was investigated; this is a solution in which the recovery of water is maximised, and the waste within the wastewater is concentrated into a solid for disposal offsite. This has a high OPEX in comparison to the routes detailed above. This option will not be developed further unless further study of Option 1 and Option 2 shows that ZLD could economically compete with these options, further information will be provided within the ES.

3.7. ALTERNATIVE OPERATIONAL TRANSPORT ROUTES

3.7.1. The Proposed Scheme will require a small number of vehicle and vessels movements, as detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**. Vehicle movements are those associated with the operation and maintenance of the facility, excluding the transport of the LCO_2 described in **Section 3.5.**

3.7.2. Due to the expected location of staff, diesel, chemicals and emergency services landside transport is the only viable method of transport. Further information on the transport routes to the Site is presented in **Chapter 18: Landside Transport (Volume 1)**.

3.7.3. It is also considered safer for the LCO_2 to be transported via marine vessels as the proximity to the general public is reduced compared to road transport. Given the end geological storage location of the LCO_2 described in **Section 3.5,** marine vessels are the only viable method of transport.

3.8. ALTERNATIVE CONSTRUCTION COMPOUND AREAS

3.8.1. No viable alternatives to the temporary construction compounds, including offsite construction compounds, have been identified. There is a lack of appropriate available land in the vicinity of the Site. In addition, the core construction compound areas identified are appropriate for this use and locating them within the Site Boundary will ensure no additional traffic movements. The land identified as temporary construction compounds will be used for the Carbon Capture Facility post construction, as shown in **Figure 1-3: Indicative Site Layout Plan (Volume 2)**.

3.9. REFERENCES

[1] Infrastructure Planning (Environmental Impact Assessment) Regulations (2017) Available at: The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (legislation.gov.uk) [Accessed: July 2023]

[2] Cory Environmental Holdings Limited. (2023). 'Environment Impact Assessment Scoping Report: Cory Decarbonisation Project'. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010128/EN010128-000021-EN010128%20-%20Scoping%20Report.pdf

[3] Department for Energy Security and Net Zero, Department for Business, Energy and Industrial Strategy (2021). 'Net Zero Strategy: Build Back Greener'. Available at: https://www.gov.uk/government/publications/net-zero-strategy [Accessed: July 2023]

[4] Department of Energy & Climate Change. (2023). 'Overarching National Policy Statement for Energy (NPS EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf

[5] Department of Energy & Climate Change. (2023). 'National Policy Statement for Renewable Energy Infrastructure (EN-3) (NPS EN-3)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147382/NPS_EN-3.pdf

DECARBONISATION

CHAPTER 4: EIA METHODOLOGY

Cory Decarbonisation Project

TABLE OF CONTENTS

TABLE

4. EIA METHODOLOGY

4.1. INTRODUCTION

4.1.1. This chapter sets out the overall approach to the EIA for the Proposed Scheme. A detailed overview of the methodology adopted for each technical topic is provided within the respective technical chapters of this PEIR. The approach to the assessment has been informed by current best practice guidance, as set out within the Planning Inspectorate Advice Note Seven[1].

4.1.2. This PEIR contains the information specified in Regulation 14(2) (a)-(f) and Schedule 4 of the EIA Regulations[2] as set out in **Table 1-1** of **Chapter 1: Introduction (Volume 1)**.

4.2. RELEVANT EXPERIENCE

4.2.1. In line with Regulation 14(4)(a) of the EIA Regulations[2], this PEIR has been prepared by a suitably qualified project team. The ES will provide details of the competent Project Team, with associated roles and expertise.

4.2.2. The Institute of Environmental Management and Assessment (IEMA) has awarded WSP the EIA Quality Mark in recognition of our commitment to excellence in EIA activities. WSP have continued to maintain this following annual examination in relation to their products, staff, innovation, and promotion of EIA practice within the industry. Furthermore, each technical chapter of this PEIR has been prepared by an individual suitably qualified expert with regard to each technical topic.

4.3. STRUCTURE OF THIS PEIR

4.3.1. This PEIR consists of three volumes:

- Volume 1: Main Text
- Volume 2: Figures
- Volume 3: Technical Appendices

4.3.2. The chapters of this PEIR are numbered as follows:

- Chapter 1: Introduction
- Chapter 2: Site and Proposed Scheme Description
- Chapter 3: Consideration of Alternatives
- Chapter 4: EIA Methodology
- Chapter 5: Air Quality
- Chapter 6: Noise and Vibration
- Chapter 7: Terrestrial Biodiversity
- Chapter 8: Marine Biodiversity
- Chapter 9: Historic Environment

- Chapter 10: Townscape and Visual[a]
- Chapter 11: Water Environment and Flood Risk
- Chapter 12: Climate Resilience
- Chapter 13: Greenhouse Gases
- Chapter 14: Population, Health and Land Use
- Chapter 15: Socio-economics
- Chapter 16: Materials and Waste
- Chapter 17: Ground Conditions and Soils
- Chapter 18: Landside Transport
- Chapter 19: Marine Navigation
- Chapter 20: Major Accidents and Disasters
- Chapter 21: Cumulative Effects
- Chapter 22: Summary of Effects

4.3.3. It is anticipated that the ES will follow a similar structure to that of this PEIR.

4.4. CONSULTATION

INFORMAL CONSULTATION

4.4.1. Non-statutory consultation and engagement has been ongoing since the 17th June 2022 when the Proposed Scheme was introduced to LBB.

4.4.2. In addition to progressing discussions with technical advisers, an introductory consultation period was open to the public between 5th June and 14th July 2023; with a dedicated website[3] launched on 5th June. The associated press release was issued to the following local media:

- News Shopper;
- South London Press;
- ThisWeek London;
- London World;
- Bexley Times; and
- East London News.

4.4.3. Notification emails were sent to stakeholders, with a fact sheet attached containing the key dates, information and concepts of the Proposed Scheme; links were provided for responses.

[a] **Chapter 10: Townscape and Visual (Volume 1)** considers arboriculture.

4.4.4. An online webinar was held on the 28th June, to provide the general public with an overview of the Proposed Scheme. The webinar was recorded and made available via the website.

4.4.5. The following political stakeholders received notification that the non-statutory consultation was launched, and a presentation was made at the Belvedere Community Forum on 15th June 2023.

- Members of Parliament (MP):
  - MP representing Erith and Thamesmead;
  - MP representing Dagenham and Rainham;
  - MP representing Bexleyheath and Crayford; and
  - MP representing Greenwich and Woolwich.
- Councillors:
  - Three councillors representing Thamesmead East;
  - Three councillors representing Belvedere;
  - Two councillors representing Slade Green & Northend;
  - Two councillors representing Erith;
  - Two councillors representing Northumberland Heath;
  - Two councillors representing Barnehurst;
  - Three councillors representing Crayford;
  - A councillor representing Bridge;
  - A councillor representing Burnham;
  - Two councillors representing Town; and
  - Three councillors representing Temple Hill.

4.4.6. This PEIR forms part of the current, statutory consultation being undertaken, as required by the Planning Act 2008[4] and the EIA Regulations[2] and has been developed to help consultees to develop an informed view of the likely significant effects of the Proposed Scheme.

4.4.7. Further detail about all the consultation undertaken for the Proposed Scheme will be provided in the **Statement of Community Consultation (SoCC)** and **Consultation Report**, which will be submitted as part of the application for development consent.

EIA CONSULTATION

4.4.8. As part of the EIA process, consultation is ongoing with both statutory and non-statutory consultees. A list of the consultees contacted by the Planning Inspectorate as part of the EIA Scoping process is provided within Appendix 1 (Tables A1-A4) of the EIA Scoping Opinion[5]. The following consultees provided a response to the Planning Inspectorate, the individual responses are provided within the EIA Scoping Opinion[5]:

- Commissioner of Police of the Metropolis (the Metropolitan Police Service) and the Mayor's Office for Policing and Crime;
- Dartford Borough Council;
- Environment Agency;
- ESP Utilities Group;
- Fulcrum Pipelines Ltd;
- Historic England;
- London Borough of Bexley;
- NATS En-Route Safeguarding;
- National Grid Electricity Transmission Plc;
- National Grid Gas;
- Natural England;
- Northern Gas;
- Port of London Authority;
- Sevenoaks District Council;
- Thames Water;
- Trinity House; and
- United Kingdom Health Security Agency.

4.4.9. The purpose of consultation with statutory consultees is to brief them on the Proposed Scheme, seek feedback on the proposed approach to the assessment and mitigation development and to obtain baseline data. Technical and procedural consultation has been ongoing and will continue with statutory bodies, including their responding to this statutory consultation. A summary of consultation undertaken to date for each topic is included in **Chapter 5: Air Quality (Volume 1)** to **Chapter 21: Cumulative Effects (Volume 1)** of this PEIR.

4.4.10. The EIA Scoping Opinion[5] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26th May 2023. The responses from the Planning Inspectorate in relation to the introductory chapters of the EIA Scoping Report[6] (Chapter 2: Site and Proposed Scheme Description and Chapter 3: EIA Methodology of the EIA Scoping Report) and how these requirements have or will be addressed by the Applicant, are set out in **Table 4-1** below. Responses to the Planning Inspectorate's comments on the technical chapters is set out in **Section X.3** of each technical chapter.

Table 4-1: Response to the EIA Scoping Opinion in Relation to the Introductory Chapters of the EIA Scoping Report

Section ID	Scoping Opinion Comments	Response
Planning Inspectorate		
2.1.1	*"The Scoping Report presents a relatively high level description of the Proposed Development (noting that a zoning plan will be developed at a later stage), which has limited the Inspectorate's ability to provide detailed comments on the project description at this time. The locations of principal development components within the application site are not yet confirmed and that their anticipated heights have not been provided, except for an indicative maximum (worst-case scenario) height of 90m AOD for the absorber column stack.* *At the point of application, the description of the physical characteristics of the Proposed Development should be sufficiently developed to include further details regarding the design, size and locations of the different elements of the Proposed Development. This should include the footprint and heights of both temporary and permanent structures and land-use requirements for all phases and elements of the Proposed Development. This should be supported (as necessary) by figures, cross sections and drawings which should be clearly and appropriately referenced.* *The Applicant should make effort to fix the siting of each component and reduce uncertainty where feasible; where this is not possible, the Applicant should provide justification and ensure that the ES*	**Figure 1-3: Indicative Site Layout Plan (Volume 2)** shows the zones that comprise the Site, indicating the approximate locations of principal components of the Proposed Scheme, which are also described in **Chapter 1: Introduction (Volume 1)** and explained further in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** of this PEIR. The maximum parameters for the Proposed Scheme are described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** of this PEIR. Further details regarding the physical characteristics of the design, size and location of the different elements of the Proposed Scheme will be provided as part of the application for development consent. This PEIR has, and the subsequent ES will, assess the worst-case scenario and adopt a parameters based approach, which is explained further within this chapter (**Chapter 4: EIA Methodology (Volume 1)**).

Section ID	Scoping Opinion Comments	Response
	assesses a worst-case scenario adopting a parameters based approach."	
2.1.2	*"The Scoping Report refers to the development of destination geological storage locations offshore and the transportation of LCO_2 and low carbon hydrogen, which do not form part of the Proposed Development which is subject to a proposed application for Development Consent under the Planning Act 2008.* *The ES should clearly describe the relationship between the Proposed Development and connected projects. This should include the extent to which the Proposed Development is dependent on their delivery and the development timelines and anticipated consenting routes of the other projects, with an explanation of how these will be coordinated.* *The Scoping Report states that the "downstream" effects of the transporting the LCO_2 (via the River Thames) and hydrogen (via pipeline connection, hydrogen tube trailers or hydrogen tankers (ships) may be assessed as part of the ES for the Proposed Development, "where appropriate".* *The ES should explain the likely methods proposed to transport LCO_2 and hydrogen from the site and should demonstrate that the methods considered are deliverable. Accordingly, the assessment should address the potential for any of these methods to result in a likely significant effect. The Inspectorate advises that the ES sets out clearly and in detail, how the assessment addresses impacts resulting from consequential development and activity where*	As described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer included in the scope of the Proposed Scheme. The current options for the transportation of LCO_2 and geological storage destinations are discussed within **Chapter 2: Site and Proposed Scheme Description (Volume 1)**. Chapter 21: Cumulative Effects (Volume 1) of the ES will assess the relationship between the Proposed Scheme and these connected projects. However, both the transportation and storage of the LCO_2 falls out of the scope of the Proposed Scheme and consequently the technical chapters of this PEIR and the subsequent ES, with the following exceptions: • **Chapter 5: Air Quality (Volume 1)**, which considers marine vessel emissions of NO_2, PM_{10} and $PM_{2.5}$ (the assessment will be presented in the ES); • **Chapter 8: Marine Biodiversity (Volume 1)**, which assesses the potential impacts of vessel strikes on marine mammals;

Section ID	Scoping Opinion Comments	Response
	significant effects are likely to result (e.g shipping of LCO_2 and transport of hydrogen). The ES should clearly explain and justify the boundaries and limitations of the assessment and, noting uncertainty may persist, any reasonable assumptions that have been applied (e.g. number and routing of vessel movements etc). The assessment should address the worst case (which may differ for different aspects), and if the nature and likely impacts of transport methods are very different, then the Applicant should consider the need to assess each option individually."	• **Chapter 13: Greenhouse Gases (Volume 1)** which assesses the potential impacts of the transportation of LCO_2 for the geological storage destination option that is the furthest in distance from the Site; as this is the worst-case scenario; • **Chapter 19: Marine Navigation (Volume 1)**, which considers impacts of collision, contact, grounding and breakout (the assessment will be presented in the ES); and • **Chapter 20: Major Accidents and Disasters (Volume 1)**, which assesses the risk of transport accidents in the River Thames. Further detail is provided within the respective technical chapters of this PEIR and will be provided within the subsequent ES.
2.1.3	*"The ES should confirm the maximum number and the maximum (and where relevant, minimum) height and diameter of the proposed stack/s. Should flexibility be required, any limits of deviation should be taken into account in relevant ES assessments, particularly with regards to air quality modelling and the Townscape and Visual Impact Assessment. The ES should identify and assess the worst case scenario for the stacks for relevant aspect chapters (noting that this may differ between aspects)."*	**Chapter 2: Site and Proposed Scheme Description (Volume 1)** details the maximum number and the maximum (and where relevant, minimum) height, width and length of the proposed stacks. These parameters are considered the worst-case scenario and have been assessed as appropriate in the technical chapters of this PEIR.
2.1.4	*"The Scoping Report identifies available options for the principal components of the Proposed Development. The options include a*	As described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project and the battery energy storage

Section ID	Scoping Opinion Comments	Response
	number of potential sources for the water supply for the Electrolysis Plant and different approaches relevant to the export of hydrogen offsite, including whether a pipeline would be brought forward by a distribution network operator. There is also uncertainty regarding whether construction materials would be delivered via road/ water, the number of buildings required to house electrolyser arrays and associated plant, and the backup power supplies for the CCS Project and Hydrogen Project (described as "…for example a battery energy storage system and/or emergency standby generators"). *The Inspectorate notes that early determination of options and engagement with relevant consultation bodies will support a more robust assessment of likely significant effects and provide certainty to those likely to be affected. Where it is determined that options cannot be excluded and flexibility needs to be retained, this should be fully justified. Where options are retained, the assessment should address the worst case (which may differ for different aspects), and where the nature and likely impacts of options are very different, then the Applicant should consider the need to assess each option individually, specifying mitigation where required."*	system are no longer included in the scope of the Proposed Scheme. The delivery of construction materials and the backup power supply is described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**. The options identified for the potential sources of water supply for the Proposed Scheme are described in **Chapter 3: Consideration of Alternatives (Volume 1)**. The chosen options for the source of water supply to the Proposed Scheme are described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** and assessed within the relevant technical chapters. Engagement has and will continue to be undertaken with consultation bodies, where relevant, as described in this chapter (**Chapter 4: EIA Methodology (Volume 1)**). The engagement has and will continue to be both direct and as part of statutory consultation for the Proposed Scheme. Any consultation undertaken to date and specific mitigation measures are described in the technical chapters of this PEIR. This PEIR has, and the subsequent ES will, assess the worst-case scenario and adopt a parameters based approach, which is explained further within this chapter (**Chapter 4: EIA Methodology (Volume 1)**).

Section ID	Scoping Opinion Comments	Response
2.1.5	*"If the Proposed Development includes works that may affect the existing drainage regime including ditches these should assessed in the ES. In particular the assessment should focus on upgrades to or construction of crossing points, including any crossings required temporarily for construction."*	The Proposed Scheme will require a new drainage system within the Site. A description of the likely drainage system is provided within **Chapter 2: Site and Proposed Scheme Description (Volume 1)** and assessed within the relevant technical chapters. An Outline Drainage Strategy will be prepared as part of the ES. The Strategy will contain relevant information on the existing drainage regime and the new drainage regime designed as part of the Proposed Scheme, including any proposed works to ditches. Further detail about the baseline (existing) drainage regime is provided within **Chapter 2: Site and Proposed Scheme Description (Volume 1)** and **Chapter 11: Water Environment and Flood Risk (Volume 1)**. The preliminary assessment of the potential impacts of the Proposed Scheme on the existing drainage regime is provided within **Chapter 7: Terrestrial Biodiversity (Volume 1)** (as habitats and through their supporting value to water voles) and **Chapter 11: Water Environment and Flood Risk (Volume 1)** of this PEIR.

Section ID	Scoping Opinion Comments	Response
2.1.6	*"Paragraph 2.1.17 states that "A portion of the Crossness LNR is proposed to be included in the Site Boundary" and paragraph 6.6.2 states that "The Proposed Scheme will likely result in the loss of part of Crossness LNR". The ES should quantify the amount of land within the Crossness LNR which is located within the application site and describe in detail the works which would take place within the LNR.* *The scoping consultation response from Thames Water (Appendix 2 of this Opinion) states that Crossness LNR was required to be provided and maintained for at least 99 years by a section 106 legal agreement associated with a previous planning permission. Where there is potential for the Proposed Development to impact on the Crossness LNR, the ES should include an assessment of relevant effects, including any effects on the ability to deliver outcomes required through the mitigation provided under the previous scheme."*	The amount of land of the Crossness LNR within the Site is described and quantified in **Chapter 7: Terrestrial Biodiversity (Volume 1)** of this PEIR. The works likely to take place within the Crossness LNR are shown on **Figure 1-3: Indicative Site Layout Plan (Volume 2)** and also described within **Chapter 7: Terrestrial Biodiversity (Volume 1)** of this PEIR. **Figure 1-3: Indicative Site Layout Plan (Volume 2)**, shows the Mitigation Area, which is described in **Chapter 1: Introduction (Volume 1)** and further details are provided in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** of this PEIR. The commitments made by Thames Water in relation to the Crossness LNR are provided in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**. **Chapter 7: Terrestrial Biodiversity (Volume 1)** of this PEIR assesses the potential ecological effects of the Proposed Scheme on the Crossness LNR[b] and considers the ability of the Proposed Scheme to continue to deliver outcomes required under the previous permission. The draft DCO submitted as part of the application will be able to deal with the impacts of any crossover with the section 106 agreement and previous planning permission.

Section ID	Scoping Opinion Comments	Response
2.1.7	*"The description in the ES of the nature and quantity of materials and natural resources to be used during the operational phase (and where relevant, stored on site) should include the solvent for chemical absorption in the Carbon Capture Plant and the water supply for the Electrolysis Plant.* *The volume of amine-loaded waste to be produced by the Solvent Regeneration System, stored on site and transported off site for incineration should also be estimated.* *The description of the land use requirements of the operational phase should include the locations of storage areas (including for materials, liquids, water and wastes) within the application site."*	A description of the nature and quantity of the chemicals in relation to the Carbon Capture Facility (including amine-based solvents), during operation, will be provided in Chapter 16: Materials and Waste (Volume 1) of the ES and the proposed scope and methodology for this assessment is provided in **Chapter 16: Materials and Waste (Volume 1)** of this PEIR. **Chapter 2: Site and Proposed Scheme Description (Volume 1)** describes the chemicals used in the Carbon Capture Facility and sets out that small volumes of amine-loaded sludge will be produced as a by-product of the carbon capture process. This will be temporarily stored onsite prior to being transported offsite to an appropriate waste treatment facility as hazardous waste. The volume of amine wastewater effluent will also be comparatively small. The waste will be disposed of by specialised contractors, taking the waste offsite for disposal via road tanker. An estimate of the volume of amine-loaded waste produced during operation of the Proposed Scheme will, where information is available, be provided in Chapter 16: Materials and Waste (Volume1) of the ES

[b] The assessment will extend to quantification of the baseline value of habitats within Crossness LNR using the Defra biodiversity metric, used to inform Biodiversity Net Gain principles.

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		and the proposed scope and methodology for this assessment is provided in **Chapter 16: Materials and Waste (Volume 1)** of this PEIR. The description of the land use requirements of the operation phase are described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** of this PEIR and will be further detailed in the ES**.** The final, permanent, LCO_2 storage locations do not form part of the Proposed Scheme.
2.1.8	*"The Scoping Report presents little information in relation to proposed works in the marine environment. The ES should describe in detail all proposed works in the marine environment. The ES should identify areas that would be dredged during construction and operation and the likely quantities of material that would be dredged, along with the methods and frequencies of these activities and likely location for any disposal. Any likely significant effects should be assessed in the relevant ES aspect chapters."*	**Chapter 2: Site and Proposed Scheme Description (Volume 1)** of this PEIR describes the proposed works in the marine environment, including dredging requirements and the proposed dredging regime, during the construction and operation phases. Likely significant effects on the marine environment as a result of the Proposed Scheme are discussed in **Chapter 8: Marine Biodiversity (Volume 1)** and **Chapter 19: Marine Navigation (Volume 1)** of this PEIR.
2.1.9	*"The ES should describe the technical capacity of the backup power supplies for the CCS Project and Hydrogen Project (described in the Scoping Report as "…for example a battery energy storage system and/or emergency standby generators")."*	As described in **Chapter 1: Introduction (Volume 1)** of this PEIR, the battery energy storage system is no longer included as part of the Proposed Scheme. **Chapter 2: Site and Proposed Scheme Description (Volume 1)** of this PEIR describes the main

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		components of the back-up power supply for the Proposed Scheme; which will be diesel generators.
2.1.10	*"The ES should detail the number of full and part time jobs anticipated to be generated by all phases of the Proposed Development.* *It should be explained how the construction workforce would vary depending on whether the CCS Project is constructed in either a single phase or two phases."*	Paragraph **2.4.9** of **Chapter 2: Site and Proposed Scheme Description (Volume 1)** of this PEIR details the estimated peak workforce. Further information is provided in **Chapter 15: Socio-economics (Volume 1)** of this PEIR. The peak construction workforce requirement is associated with Option 2 (parallel construction) as this would require a more intensive resource requirement due to the shorter construction programme. Whereas Option 1 (phased construction) would require a less intensive resource requirement due to the longer construction programme.
2.1.11	*"The ES should confirm the locations and sizes of the construction compound(s) and where possible, show detailed layouts. Any mitigation measures proposed to avoid or minimise impacts relating to the use of compounds should be described in the ES."*	**Figure 1-3: Indicative Site Layout Plan (Volume 2)** shows the zones that comprise the Site and indicates the approximate locations of principal components of the Proposed Scheme, including Temporary Construction Compounds. Temporary Construction Compounds are also described in **Chapter 1: Introduction (Volume 1)** and explained further in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** of this PEIR.

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		Further detail regarding the location and sizes of the construction compounds will be provided within the ES. Mitigation measures relating to the Temporary Construction Compounds are included within the relevant technical chapters of this PEIR.
2.1.12	*"The Scoping Report notes that some 24-hour working is likely to be required. The locations and types of such activities should be identified and any likely significant effects from these works assessed within the ES."*	A described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, during construction, it is expected that core working hours for the landside activities (Carbon Capture Facility, Ancillary Infrastructure and Mitigation Area) will be Monday to Friday 07:00 to 19:00. On Saturdays, standard working hours will be 07:00 to 13:00. It is not expected that construction work will be undertaken on Sundays or Bank Holidays. However, the majority of noisy works (i.e., those audible at the façade of residential premises) will be undertaken during the hours of 08:00 to 18:00 hours Mondays to Fridays and 08:00 to 13:00 hours on Saturdays with no noisy works on Sundays/Public Holidays. Marine construction activities (the Proposed Jetty) will be in a tidal environment and therefore could take place 24 hours and 7 days a week. Once construction is complete, the Proposed Scheme is expected to be operational 24 hours per day and

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		365 days per year. The Proposed Scheme will operate concurrently with Riverside 1 and Riverside 2 (once operational).
2.1.13	*"The ES should detail the number of anticipated vehicle and vessel movements during all phases of the Proposed Development, including those required for dredging and disposal, and explain the assumptions upon which these have been established.* *In relation to vessels, the ES should provide details of berthing and navigational arrangements, direction and distances of travel, and a recommended speed limit for vessels including how this would be enforced.* *The ES should also consider, within relevant sections, the requirement for contingency plans during construction and operation in the event that river navigation is not possible, for example extreme meteorological events or jetty outage."*	**Chapter 2: Site and Proposed Scheme Description (Volume 1)** of this PEIR describes the current understanding of the potential construction and operation vessel movements and management for the Proposed Scheme. Further detail, including berthing and navigational arrangements, will be provided within the ES. The requirement for contingency plans during construction and operation, in the event that river navigation is not possible, will be described in the Preliminary Navigational Risk Assessment and Outline Emergency Preparedness and Response Plan, which will be prepared and submitted alongside the application for development consent. Further information on the approach to the Preliminary Navigational Risk Assessment is provided in **Chapter 19: Marine Navigation** and **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)**.

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2.1.14	*"The ES should provide a full description of the nature and scope of operation and maintenance activities, including types of activity and frequency. This should include consideration of potential overlapping of activities with those required for the continuing operation of Riverside 1 and future operation of Riverside 2."*	A description of the nature and scope of operation and maintenance activities of the Proposed Scheme is provided in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** of this PEIR. Further detail will be provided within the ES.
2.1.15	*"The assessment in the ES should take into account the locations of existing infrastructure and identify any interactions between it and the Proposed Development. Any impacts to existing infrastructure which are likely to result in significant effects should be assessed. In particular, the Applicant's attention is drawn to the scoping consultation responses from Thames Water, the Environment Agency, National Grid Electricity Transmission Plc and Northern Gas (see Appendix 2 of this Opinion), which highlight flood defences and electricity transmission, gas and water infrastructure that could be affected by the Proposed Development."*	**Chapter 2: Site and Proposed Scheme Description (Volume 1)** describes the existing utilities infrastructure within the Site and how these have been considered in the design of the Proposed Scheme. **Chapter 11: The Water Environment and Flood Risk (Volume 1)** of this PEIR assesses any potential significant effects on the existing flood defences and **Chapter 20: Major Accidents and Disasters (Volume 1)** of this PEIR considers any potential risks to the existing electricity transmission, gas and water infrastructure.
2.1.16	*"The scoping consultation response from Thames Water (Appendix 2 of this Opinion) indicates that if the water supply is to be via mains water connection, works to existing water infrastructure may be required. The ES should take into account impacts resulting from any works required to utilities infrastructure to serve the Proposed Development."*	The intended water supply for the Proposed Scheme is described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** of this PEIR. Further detail will be provided within the ES. Any potential effects resulting from any works required to utilities infrastructure will be assessed within Chapter 21: Cumulative Effects of the ES.

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2.1.17	*"The ES should describe the proposed site entrance/s and the routes to be used for all vehicular and vessel access during construction and operation of the Proposed Development and this information should be clearly presented on supporting plans within the ES.* *The ES should describe and assess the potential impacts (both positive and negative) associated with any improvements/ changes to the access routes which are either required to facilitate construction/ operation of the Proposed Development or are required for restoration purposes on completion of the works.* *The ES should explain how the proposed access route(s) relate to sensitive receptors."*	**Chapter 2: Site and Proposed Scheme Description (Volume 1)** of this PEIR describes the proposed access routes during the construction and operation phases. There are not proposed to be any changes to the main access route into the Site. The current access road (Norman Road) will be used during the construction and operation phases. Further detail, including details of any improvements, will be provided within the ES. A description, and an assessment, of the potential effects associated with the access routes are provided, where relevant, within the appropriate technical chapters of this PEIR; further detail will be provided within the ES. **Chapter 18: Landside Transport (Volume 1)** of this PEIR includes an assessment of effects upon access routes. It is assumed that vehicles, including HGV, would access the Site via the A282/M25, A206, A2016 and Norman Road.
2.1.18	*"Chapter 19 of the Scoping Report states that as much of the application site is brownfield land which has already been developed, the discovery of previously unidentified UXO is unlikely. No reference is made to the likely risk of encountering UXO in the marine area of the application site.*	A high-level assessment of the potential impacts associated with the risk of encountering UXO in both the marine and terrestrial area of the Site is provided in **Chapter 17: Ground Conditions and Soils (Volume 1)** of this PEIR.

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	In view of the location, nature and characteristics of the Proposed Development, the Inspectorate advises that the ES should include a high-level assessment of impacts from UXO in relevant aspect chapters based on a likely worst case scenario. Any assumptions used in the definition of the worst case scenario should be explained in the ES."	
2.1.19	*"The ES should describe the location and methods applied for piling activities (including any piling in the marine area) and explain any assumptions made in this regard. Any likely significant effects should be assessed and any proposed mitigation measures described."*	Indicative locations for piling, and the proposed piling methods, are described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** of this PEIR. Further detail will be provided within the ES.
2.1.20	*"The Proposed Development may involve the demolition of a single industrial facility (Munster Joinery Warehouse) which is located within the application site. The ES should provide a description of any demolition works required and assessment of any resulting likely significant effects."*	**Chapter 2: Site and Proposed Scheme Description (Volume 1)** of this PEIR describes the likely demolition works required for the Proposed Scheme and these works have been considered in the relevant technical chapters of this PEIR. Further detail will be provided within the ES.

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2.2.1	*"Paragraph 3.8.2 of the Scoping Report states that there are no plans to decommission and remove the Proposed Development and were it to be removed, it would be likely to require a similar degree of plant, equipment and disturbance to that predicted during construction. At the end of the anticipated 25 year operational lifespan, a decision would be taken as to whether to extend the operational life of the Proposed Development.* *The Inspectorate does not consider that sufficient information has been provided regarding the location and nature of the works in order to scope out impacts from decommissioning. The ES should provide aproportionate description of the activities and works which are likely to be required to decommission the Proposed Development or extend its operational life, and the anticipated duration. Where significant effects are likely to occur as a result of works to decommission the Proposed Development or extend its operational life, these should be described and assessed in the ES."*	As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** and **Section 4.10** of this chapter, any decommissioning would be likely to be completed in less time than the construction phase and would be likely to require a similar degree of plant, equipment and disturbance to that predicted during construction and so this PEIR has not assessed this phase separately, rather, it has assumed that such phase would have similar or less effects than the construction phase. In order to demonstrate this **Chapter2: Site and Proposed Scheme Description (Volume1)**, by technical topic, demonstrates that there are unlikely to be any new or different significant effects during decommissioning than those identified during construction. A Demolition Environmental Management Plan will be prepared in advance of decommissioning commencing.
2.2.2	*"The ES should assess impacts from any thermally elevated discharges into the River Thames which are likely to result in significant effects on ecological receptors."*	Water discharge from the Proposed Scheme is described in **Chapter 2: Site and Proposed Scheme (Volume 1)** of this PEIR.
2.2.3	*"Having regard to the nature and characteristics of the Proposed Development, the Inspectorate is content that any impacts from radiation are not likely to result in significant effects. This matter can be scoped out of the ES."*	No response required.

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2.2.4	*"Paragraph 3.10.1 of the Scoping Report proposes to scope out lighting, however other sections of the Scoping Report (e.g. Chapter 6: Terrestrial Biodiversity) identify impacts from lighting as scoped into the assessment, meaning the proposed approach is unclear. The Inspectorate is therefore not in a position to agree that this matter can be scoped out. The ES should assess impacts from lighting which are likely to result in significant effects."*	**Chapter 2: Site and Proposed Scheme Description (Volume 1)** of this PEIR describes lighting for the Proposed Scheme**.** The assessment of the potential effects from lighting emissions of the Proposed Scheme is provided in **Chapter 7: Terrestrial Biodiversity (Volume 1)** and in **Chapter 8: Marine Biodiversity (Volume 1)** of this PEIR.
2.2.5	*"The ES should describe any limitations to the baseline data collection for the Proposed Development resulting from Riverside 2 currently being under construction on the application site (e.g. possible restrictions on land access), and explain how any such limitations have been addressed.* *Paragraph 3.4.8 of the Scoping Report states that where it is not possible to access third party private land, data will be collected from publicly accessible land only. The ES should be based on sufficient baseline data to support a robust assessment of likely significant effects, as required by the EIA Regulations 2017. The Applicant should make effort to agree the sufficiency of surveys required to inform the assessment with relevant consultation bodies."*	The technical chapters within this PEIR detail the limitations and assumptions of each topic, including any associated with Riverside 2 being under construction, and the ES will also do so. The future baseline section of each technical chapter includes the operation of Riverside 2 within the assumptions for the future baseline. Riverside 2 is due to be operational by 2026. This PEIR is, and the ES will be, based on sufficient baseline data to support a robust assessment of likely significant effects. Engagement has, and will continue to be, undertaken with consultation bodies where relevant, as described in this chapter (**Chapter 4: EIA Methodology (Volume 1)**) in this PEIR and subsequent ES. Any consultation undertaken, including that relating to surveys, is described in each technical chapter where relevant.

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2.2.6	*"The Scoping Report refers to use of information gathered and presented within the Ess for previous projects (primarily Riverside 2).* *The ES should utilise available datasets (for example, air quality monitoring data for Riverside 1) and identify where this is required be supplemented by new surveys to ensure that the assessment is based upon up-to date information and is representative of the baseline at the time of production. Data collected in relation to other projects and used within the ES for this Proposed Development should be clearly referenced and the ES should include an explanation of why that data is considered applicable and to remain representative of the current and future baseline."*	The baseline data used is described in each technical chapter of this PEIR. Where data has been utilised, or is proposed to be used, from previous schemes, such a Riverside 1 and Riverside 2 clear justification for the appropriateness of this has been provided.
2.2.7	*"The Inspectorate notes the ES would be based on an assumption that Riverside 2 is completed and operational by 2026. Construction of the Proposed Development is scheduled to start in Q1 2026.* *If there is any change to this position and there is potential for overlapping construction of the two projects, the ES should describe and assess a worst case."*	Riverside 2 is on programme and is planned to be operational by 2026. Construction of the Proposed Scheme remains scheduled to commence in 2026.
2.2.8	*"The description of reasonable alternatives in the ES should include any alternatives to the use of land within Crossness LNR and the main reasons for selecting that option, including a comparison of the environmental effects."*	**Chapter 3: Consideration of Alternatives (Volume 1)** describes the main reasons for selecting the preferred location for the Proposed Scheme and the alternative sites considered outside of the Crossness LNR.

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2.2.9	*"The Scoping Report (paragraph 10.6.2 and Table 19-4) confirms that an Emergency Preparedness and Response Plan will be developed. A draft/ outline version of this plan should be provided with the ES and the ES should confirm how adherence with the plan would be secured through the dDCO or other legal mechanism.* *If impacts from measures in this plan (for example backup generators in the event of a loss of electrical power) are likely to result in significant effects, these should be assessed in relevant ES chapters."*	An Outline Emergency Preparedness and Response Plan will be included as part of the application for development consent. Any likely effects are preliminarily assessed within **Chapter 20: Major Accidents and Disasters (Volume 1)** of this PEIR.
2.2.10	*"The Inspectorate on behalf of the SoS has considered the Proposed Development and concludes that the Proposed Development is unlikely to have a significant effect either alone or cumulatively on the environment in a European Economic Area State. In reaching this conclusion the Inspectorate has identified and considered the Proposed Development's likely impacts including consideration of potential pathways and the extent, magnitude, probability, duration, frequency and reversibility of the impacts.* *The Inspectorate considers that the likelihood of transboundary effects resulting from the Proposed Development is so low that it does not warrant the issue of a detailed transboundary screening. However, this position will remain under review and will have regard to any new or materially different information coming to light which may alter that decision.* *Note: The Proposed Development subject to this transboundary screening is the Cory Decarbonisation Project (to be located within*	It is noted that, based on the information provided to date, the Proposed Scheme does not warrant the preparation of a detailed transboundary screening. However, if any changes to the Proposed Scheme are likely to result in potential significant effects this will be assessed within the ES.

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	the site boundary shown on Figure 1-1 of the Scoping Report), which is subject to a proposed application for Development Consent under the Planning Act 2008. Disposal of CO2 offshore does not form part of the Proposed Development and development of offshore elements of the project, including off-site geological storage locations for the captured CO2, is subject to separate consenting requirements. *The SoS' duty under Regulation 32 of the 2017 EIA Regulations continues throughout the application process.* *The Inspectorate's screening of transboundary issues is based on the relevant considerations specified in the Annex to its Advice Note Twelve, available on our website at http://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/"*	
2.2.11	*"The Scoping Report refers to the draft NPS' published in 2021. The ES should make reference to the most recently available version of the draft NPS, currently from March 2023, or the adopted NPS if published by the time of authoring of the ES."*	This PEIR makes reference to the latest versions of the Draft NPSs published in 2023[7]. The ES will also make reference to the latest versions of the NPS available at the time of writing.
Environment Agency		
2.2.41	*"During summer droughts when dissolved oxygen levels in the estuary can be depressed (especially when storm sewers vent raw sewage (something which should reduce, but not end completely, following the operation of the Thames Tideway Tunnel) an alternative and possibly beneficial option may be to vent the oxygen*	**Chapter 2: Site and Proposed Scheme Description (Volume 1)** provides a description of the types of wastewater and how wastewater will be generated and treated as part of the Proposed Scheme. It is not practicable to vent the oxygen via a diffuser into the

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	via a diffuser into the tideway water, to elevate dissolved oxygen levels."	Thames Tideway Tunnel which is located approximately 5km north west of the Site Boundary. Appropriate mitigation is being considered as part of ongoing design evolution and will be presented within the ES, such mitigation will include environmental permits or other discharge consents where appropriate. Extreme temperatures events and droughts are assessed in **Chapter 12: Climate Resilience (Volume 1)**. The assessment will be updated and presented in the ES.
2.2.56	*"New jetty requires marine licences and accompanying WFD assessments. EA are consultee to all marine licences (both PLA and MMO licenses required… MMO may be the main consultee under DCO but PLA licence required also). Marine team would expect to be included in WFD marine water quality compliance consultations. As piling and associated activities WILL disturb sediments, and sediments in this part of the river WILL contain EQSD chemicals AND CEFAS- list chemicals (at concentrations ABOVE action level 1), this activit will not "scope out" and will require the further "impact assessment" stage. Dredging will certainly require WFD impact assessment stage. We note the project has "scoped in" water quality, within the WFD scoping exercise carried out in Appendix A, and we agree with this interpretation of the guidance."*	A WFD impact assessment for the Proposed Scheme holistically (including the Carbon Capture Facility, Proposed Jetty, Ancillary Infrastructure and Mitigation Area) will be presented as a technical appendix to Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES. Both the MMO and PLA have been consulted on the Proposed Scheme, and this will continue. Further detail about the consultation undertaken for the Proposed Scheme will be provided in the Consultation Report, which will be submitted as part of the application for development consent. **Chapter 2: Site and Proposed Scheme Description (Volume 1)** provides an overview of the construction

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		activities, including piling and dredging that will be required for the construction phase of the Proposed Scheme. The suitability of the dredged material to be disposed on land or offsite at a licenced disposal site will be assessed in Chapter 16: Materials and Waste (Volume 1) of the ES. This will include consideration of the waste hierarchy, analysis of the borehole data from actual dredged area and discussions with the MMO and CEFAS.
2.2.57	*"Need for dredging noted. WFD "impact assessment stage" will be required, and we look forward to seeing it once the chemical analysis of dredge samples has been undertaken."*	No response required.
2.2.58	*"Noted a waste-water treatment plant is required. This may suggest a wastewater discharge is intended, either directly or indirectly, to the Thames Middle waterbody, and this is a matter for the EA permitting function. WFD compliance needs not be taken into account within any permit issued."*	**Chapter 2: Site and Proposed Scheme Description (Volume 1)** provides a description of the types of wastewater and how wastewater will be generated and treated as part of the Proposed Scheme. Appropriate mitigation is being considered as part of ongoing design evolution and will be presented within the ES, such mitigation will include environmental permits or other discharge consents where appropriate. A WFD impact assessment for the Proposed Scheme will be presented as a technical appendix to Chapter 11: Water Environment and Flood Risk (Volume 1) of

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		the ES. The WFD impact assessment will consider the Thames Middle Water Body. Further information on this waterbody is presented in **Chapter 8: Marine Biodiversity (Volume 1)** and **Chapter 11: Water Environment and Flood Risk (Volume 1)**.
2.3.8	*"The Construction Practice (OCoCP) will be important in the context of mitigation for WFD potential impacts during construction. Drainage of the site may have implications for the Thames."*	As detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** the Proposed Scheme will require a new drainage system within the Site. The drainage system will use the existing ditches within the Site as a point of connection, with attenuation tanks, filter drains and ponds utilised to control the discharge quality and rate to the ditches. The proposed drainage would include a system of containment to mitigate potential risk of pollution to the surrounding site area and/or environment. An Outline Drainage Strategy will be developed and included within the application for development consent. The new drainage system will be considered in the WFD impact assessment which will be presented as a technical appendix to Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES.
3.10.1	*"We question whether this statement is accurate in respect of heat. Can the applicant confirm that there will be no thermally elevated discharges into the Thames Middle waterbody as a result of this*	As detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** the temperature of the wastewater discharge is anticipated to be cooled via a heat exchanger to ensure the wastewater

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	project. If not, then they need to be scoped in, and considered in any permitting of discharges."	discharge is +/- 5°C (or less) from the in-situ River Thames temperature at the time of the wastewater discharge. The WFD impact assessment will consider the Thames Middle Water Body. The WFD impact assessment will be presented as a technical appendix to Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES.
3.12.6	*"For the WFD water quality element we agree with the WFD scoping carried out so far, in that water quality has been correctly scoped in for further detailed WFD "impact assessment" stages. These will follow when supporting information has been gathered, and we will comment upon the final WFD impact assessment for the various activities which ordinarily require marine licenses, though this will be via the DCO process."*	No response required.
London Borough of Bexley		
Policy Update	*"Land Use designations shown on figures within the Scoping Opinion and Policies should be updated to reflect the adoption of the Bexley Local Plan (2023). On 26 April 2023, the London Borough of Bexley formally adopted the Bexley Local Plan. The Local Plan, together with the Mayor's London Plan (2021), now comprise the statutory Development Plan for the borough and will be used by officers for the determination of planning applications. A new Policies Map illustrates geographically the application of the policies*	The Bexley Local Plan[8], adopted on 26 April 2023, is considered, where relevant, within **Chapter 5: Air Quality (Volume 1)** to **Chapter 21: Cumulative Effects (Volume 1)** of this PEIR.

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	in the Local Plan. The Local Plan and Policies Map replace in full the Bexley Core Strategy 2012, the remaining extant policies of the Bexley Unitary Development Plan 2004, and the Unitary Development Plan Proposals Map 2004. The Bexley Local Plan, along with the Local Plan Policies Map are available to view and download from the Council website at https://www.bexley.gov.uk/services/planning-and-building-control/planning-policyand-guidance. A number of relevant Local Plan policies are missing from the policy, sections of each chapter in the scoping report."	
Mayor's Office for Policing and Crime		
N/A	*"The EIA should give consideration to best practice guidance such as the Government's Good Practice Guide for EIA."*	The policy, legislation, and guidance relevant to each technical assessment is detailed within **Chapter 5: Air Quality (Volume 1)** to **Chapter 21: Cumulative Effects (Volume 1)** of this PEIR.
Port of London Authority		
Site Location	*"Note that the redline boundary for the proposed development is very broad at this stage, extending across the River Thames to the borough boundary line between the London Boroughs of Bexley and Barking & Dagenham. It will need to be made clear as the scheme develops the extent of the actual works affecting the Thames and how far into the Thames the proposed jetty and berthing pocket will encroach in order to amend the red line boundary as appropriate."*	The Proposed Jetty zone is the northernmost area of the Site, predominantly located within the River Thames as shown on **Figure 1-3: Indicative Site Layout Plan (Volume 2). Table 2-3** of **Chapter 2: Site and Proposed Scheme Description (Volume 1)** includes the parameters of assessment for the Proposed Scheme, including the maximum lengths, widths and heights of the Berth Pocket, Loading

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		Platform, Breasting Dolphins, Mooring Dolphins and Access Trestle. It is expected that these parameters will be further refined as part of design development. In addition to the parameters of assessment the application for development consent will be accompanied by a series of general arrangement plans, works plans, landscaping plans and engineering plans, drawings and sections which will provide further detail on the design and location of the Proposed Jetty.
General Points	*"The PLA in principle welcome the proposal which is looking to utilise the Tidal Thames as a decarbonisation hub and as a potential location for hydrogen production and fuelling. As the scheme develops the Environmental Statement (ES) will need to demonstrate how the use of the river for the transportation of construction and waste materials will be maximised in line with planning policy. It will also need to be made clear as the scheme develops any impacts as a result of the increased river traffic, once the facility is operational."*	As described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer included in the scope of the Proposed Scheme. **Chapter 2: Site and Proposed Scheme Description (Volume 1)** describes the use of the River Thames for transporting construction plant and materials. **Chapter 2: Site and Proposed Scheme Description (Volume 1)** notes that based on a preliminary operational capacity assessment, up to five marine vessels will call at the Proposed Jetty each week to collect and transport LCO_2 to meet the annual throughput. This throughput will form the basis of the operational phase assessment which will be presented in the Preliminary Navigation Risk Assessment (pNRA)

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		and Chapter 19: Marine Navigation (Volume 1) of the ES.
General Points	*"The development site has a current river works licence, including for the existing works and use of the Safeguarded Middleton Wharf. It will be vital for discussions to be held between the PLA and the applicant at an early stage with regard to the river works licencing process (including dredging) and its incorporation as part of the DCO process."*	**Table 19-3** of **Chapter 19: Marine Navigation (Volume 1)** provides a summary of the consultation and engagement undertaken with the PLA to date. Consultation and engagement will be continued throughout ongoing design development.
Chapter 2 - Site and Proposed Scheme Description	*"Paragraph 2.2.27 states that the development of the destination geological storage locations offshore and the transportation of LCO2 via the River Thames is not part of the Carbon Capture and Storage Project, although it is acknowledged that the 'downstream' effects of the transporting the LCO2 may be assessed as part of the EIA process for the Proposed Scheme, where appropriate. It is not clear what is meant by 'downstream effects of transporting LCO2' and this will require expansion in the ES."*	Of the options listed within **Chapter 3: Consideration of Alternatives (Volume 1)**, the assessment within **Chapter 13: Greenhouse Gases (Volume 1)** considers the transportation of LCO_2 for the geological storage destination option that is the furthest distance from the Site Boundary, representative of the reasonable worst-case scenario. The storage location in the North Sea is approximately 1,150km in shipping distance from the Site Boundary. However, as detailed in **Chapter 3: Consideration of Alternatives (Volume 1)** the Applicant is currently engaging with a variety of storage providers.
Chapter 2 - Site and Proposed	*"As part of the decommissioning section (paragraph 2.4.11) it is stated that The Proposed Scheme is anticipated to operate for a minimum of 25 years, and that at the end of the 25-year period, the Proposed Scheme may have some residual life remaining and therefore a decision will be made as to whether to extend the*	The Proposed Scheme is intended to operate for at least 25 years. However, for the purpose of assessing a reasonable worst-case scenario it is assumed that it could have a design life of 50 years, as per typical

Section ID	Scoping Opinion Comments	Response
Scheme Description	*operational life of the Proposed Scheme. It is essential that the PLA are included in any discussions on the long term use and any potential decommissioning of the proposed river infrastructure."*	design life of the civil and structural elements of the Proposed Scheme. At the end of the 50-year period, the Proposed Scheme may have some residual life remaining, and an investment decision will be made as to whether the operational life of the Proposed Scheme is to be extended. If it is not appropriate to continue operation, the plant will be decommissioned. The Applicant would be willing to consult and engagement with PLA should the Proposed Scheme be decommissioned in the future. Further information on the approach to decomissioning is presented in **Section 2.7** of **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.
Chapter 2 - Site and Proposed Scheme Description	*"Within chapter 2 there are several references to the installation of various pipelines as part of the proposed development, including as a potential option for the export of hydrogen off site. As the detail of the scheme progresses the location and start/end points of the proposed pipelines must be confirmed, including any associated amendments required for the red line boundary."*	The above ground pipelines, ductwork and other pipework described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** will be located within the Site. The application for development consent will be accompanied by a series of general arrangement plans, works plans, landscaping plans and engineering plans, drawings and sections which will provide further detail on the design and location of the above ground pipelines, ductwork and pipework.

Section ID	Scoping Opinion Comments	Response
Chapter 2 - Site and Proposed Scheme Description	*"Noted that during the construction stage of the development it will be ensured that Middleton Jetty will continue to operate to enable the continued operation of Riverside 1 and Riverside 2. This will need to be reflected in the associated NRA. Furthermore, as part of the construction stage detail on any temporary construction works in the river will also need to be progressed further in order for the PLA to fully understand the impacts, scale and timings of the proposed works. To highlight it will also be essential that all temporary marine related works are removed at the end of the construction phase and if required appropriate riverbed restoration undertaken."*	As stated in **Chapter 2: Site and Proposed Scheme Description (Volume 1),** Middleton Jetty is used by the Applicant for waste deliveries and IBA export, to and from Riverside 1, operations that will intensify with Riverside 2 commencing operation. The marine operations at Middleton Jetty, including the current baseline (Riverside 1) and future baseline (Riverside 2) will be considered within the pNRA and Chapter 19: Marine Navigation (Volume 1) of the ES. As evidenced in **Table 19-3** of **Chapter 19: Marine Navigation (Volume 1)** consultation and engagement has been undertaken with the PLA to date. Consultation and engagement will be continued throughout ongoing design development. The Applicant will commit within the OCoCP to the removal of any temporary construction plant and equipment upon completion of the construction phase for the Proposed Scheme.
Chapter 2 - Site and Proposed Scheme Description	*"Welcomed that paragraph 2.3.7 states that there is the possibility that some deliveries associated with the construction stage can be via the River Thames, in particular for the construction of the Proposed Jetty, and that the ES will provide further information in this regard. The PLA would support the full investigation of how the river can be utilised as part of the construction stage, noting as*	The use of the River Thames for the delivery of construction plant and materials has and will continue to be explored as part of the ongoing design development. As detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** for the landside elements of the Proposed Scheme is not practicable to use Middleton Jetty for the delivery of

Section ID	Scoping Opinion Comments	Response
	above the need to continue to operate the adjacent facility at Middleton Jetty."	construction plant and materials without compromising the effectiveness of the operations at Riverside 1 and Riverside 2 (once operational). However, for the construction plant and materials required for the Proposed Jetty transport will primarily be via the River Thames and where appropriate, plant and materials may be temporarily stored on a jack-up barge.
UK Health Security Agency		
N/A	*"It is noted that the current proposals do not appear to consider possible health impacts of Electric and Magnetic Fields (EMF)."*	Electric and Magnetic Fields (EMF) are present wherever electricity is used. The Proposed Scheme will not be generating or distributing electricity outside of the Site Boundary and as such an assessment of EMF is not considered appropriate. Further information EMF is provided the Energy Networks Association Guidance Document (2012)[9].
N/A	*"We request that the ES clarifies this and if necessary, the proposer should confirm either that the proposed development does not impact any receptors from potential sources of EMF; or ensure that an adequate assessment of the possible impacts is undertaken and included in the ES."*	Further to the response above, the Proposed Scheme will not generate or cause the exposure of any sensitive receptors to EMF and as such an assessment of EMF is not considered appropriate.
N/A	*"The ES should consider potential effects on mental health through risk perception / understanding of risk posed by the manufacture,*	As described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer included in the scope of the Proposed Scheme. An assessment of the landside Hazardous Loads is presented within

Section ID	Scoping Opinion Comments	Response
	storage and transportation of hydrogen and other hazardous substances."	**Chapter 18: Landside Transport (Volume 1).** Chapter 19: Marine Navigation (Volume 1) of the ES will include an assessment of marine vessels. An assessment of potential effects of the Proposed Scheme on mental health and wellbeing is presented within **Chapter 14: Population, Health and Land-Use (Volume 1)**.
N/A	*"Determining significance for human health should follow guidance within Pyper, R et al., 2022, published by the Institute of Environmental Management and Assessment (IEMA). The final ES should provide suitable justification for any assessment of significance."*	The IEMA 2022 Guidance 'Determining Significance for Human Health In Environmental Impact Assessment'[10], has informed the overall assessment of human health presented in **Chapter 14: Population, Health and Land Use (Volume 1)**.

4.5. DEFINING THE STUDY AREA

4.5.1. The proposed Study Area for each of the technical chapters varies according to the specific assessment, as it will vary for each discipline and is driven by the nature of the existing environmental baseline. The Study Area is described in **Chapter 5: Air Quality (Volume 1)** to **Chapter 21: Cumulative Effects (Volume 1)** of this PEIR.

4.5.2. It is also recognised that some effects impact a defined area, for example direct impacts on buried archaeology, whereas other effects are more widespread, for example considering the potential effects on townscape character.

4.6. ESTABLISHING BASELINE CONDITIONS

4.6.1. Potential likely significant environmental effects are described in this PEIR in relation to the extent of changes to the existing baseline and future baseline environment, as a result of the construction and/or operation of the Proposed Scheme. The baseline environment includes the existing environmental characteristics and conditions based on surveys undertaken and information available at the time of the assessment.

4.6.2. Baseline conditions have, and will continue, to be established by:

- site visits and surveys;
- desk based studies; and
- topic specific modelling.

4.6.3. The baseline conditions for each technical topic as currently understood are set out within **Chapter 5: Air Quality (Volume 1)** to **Chapter 20: Major Accidents and Disasters (Volume 1)** of this PEIR.

4.6.4. The baseline conditions used in this PEIR will vary depending on the timing of surveys or the date at which data sources have been produced/assessed. It is anticipated that information required to inform the baseline environment for the assessments will be based on data obtained, or surveys completed, between Q2 of 2022 and Q4 of 2023. Where appropriate, existing baseline data collected prior to this period may be used to inform the assessment if it is deemed to remain relevant.

4.6.5. Data obtained from third party sources may be older, but the origin of all third-party data and its applicability to the assessment will be clearly outlined, alongside any limitations and assumptions.

4.6.6. It is assumed, for the purpose of this PEIR and the subsequent ES, that the baseline conditions at the Site will include Riverside 1 operating at peak capacity (i.e., a maximum throughput at Riverside 1 of 850,000 tonnes per annum). The baseline conditions do not account for Riverside 2 construction activities being undertaken. Where there are deviations to this approach this is described in the relevant technical chapters of this PEIR. The assessment presented within the technical chapters are based on Riverside 2 being operational ahead of the construction phase for the Proposed Scheme commencing.

LIMITATIONS

4.6.7. The period of validity for each set of baseline data collected will be set out in this PEIR and the subsequent ES. Where appropriate, the requirement for any repeat surveys will be specified, such as for species data.

4.6.8. It has, and will continue, to be necessary to collect baseline data from third party private land. Where it is not possible to access third party private land by agreement, data has, and will continue, to be collected from publicly accessible land only.

4.7. ESTABLISHING FUTURE BASELINE CONDITIONS

4.7.1. This PEIR includes an outline of the likely evolution of the existing baseline without implementation of the Proposed Scheme, based on available information and knowledge and including consideration of the effects of climate change. This information is set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** and **Chapter 5: Air Quality (Volume 1)** to **Chapter 20: Major Accidents and Disasters (Volume 1)** of this PEIR.

4.7.2. It is assumed for the purpose of this PEIR that the future baseline conditions within the Site will include the Riverside Campus as two operational facilities at capacity (i.e. a maximum throughput at Riverside 1 of 850,000 tonnes per annum and a maximum throughput at Riverside 2 of 805,920 tonnes per annum). At the time of writing this PEIR, Riverside 2 is under construction. It is intended that construction of Riverside 2 will be complete prior to construction commencing for the Proposed Scheme.

4.8. APPROACH TO MITIGATION

4.8.1. IEMA issued 'Shaping Quality Development'[11] in November 2015 and 'Delivering Quality Development'[12] in July 2016. In accordance with these guidance documents, three types of mitigation will be identified and used within this PEIR:

- Primary mitigation – modifications to the location or design during the pre-application phase that are integral to the Proposed Scheme. These measures are treated as an inherent part of the Proposed Scheme;
- Secondary mitigation – actions that will require further activity to achieve the anticipated outcome. The effectiveness of such measures will be assessed within this PEIR and appropriate mitigation will be secured by the DCO or other suitable mechanism; and
- Tertiary mitigation – actions that would occur with or without input from the EIA. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are standard to meet other existing legislative requirements, or actions that are standard practices used to manage commonly occurring environmental effects. These measures are treated as an inherent part of the Proposed Scheme.

4.8.2. The primary and tertiary mitigation is presented in the Proposed Scheme description in this PEIR (**Chapter 2: Site and Proposed Scheme Description (Volume 1)**) and the technical chapters of this PEIR. Primary and tertiary mitigation is referred to as 'embedded mitigation'. The assessment of the likely significant environmental effects for the pre-mitigation scenario takes embedded mitigation into account in determining the magnitude of change.

4.8.3. Following assessment of the likely significant effects of the Proposed Scheme with embedded mitigation, any secondary mitigation measures that are identified to be necessary, referred to as 'additional mitigation', are outlined within the relevant technical chapter of this PEIR. These mitigation measures will further reduce an adverse effect or enhance a beneficial one.

4.8.4. A summary of the design embedded mitigation is included in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** of this PEIR and in the Design Report that will accompany the application for development consent. The additional mitigation for each topic will be recorded in the summary chapter of the ES.

4.8.5. In addition, a Register of Commitments, which will be prepared as part of the application for development consent, will document the additional mitigation and monitoring proposed and will indicate in which certified documents the commitments will be implemented and secured. This will include mitigation presented in the ES. The delivery of these mitigation measures will be secured through requirements in the draft DCO and other suitable mechanisms, as appropriate.

4.8.6. Protective provisions are a further mechanism by which mitigation measures to protect the interests of utility owners will be secured. Relevant protective provisions will be included within the draft DCO, as required.

4.9. MONITORING

4.9.1. The EIA Regulations[2] require, where appropriate, the monitoring of potential significant adverse effects. Monitoring arrangements proposed as part of the identified mitigation are outlined within the technical chapters of this PEIR. These will also be detailed within the relevant technical chapter of the ES and detailed within a Register of Commitments (which will indicate in which certified documents the commitments will be secured) and the draft DCO, as appropriate. The results of any monitoring will be shared with the relevant organisations, where applicable.

4.10. PRELIMINARY ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

4.10.1. This PEIR reports on the potential likely significant effects for the construction and operation (including maintenance) phases of the Proposed Scheme at this stage of the design, and reports an estimate, by type and quantity, of expected residues and emissions.

4.10.2. Any decommissioning would be likely to be completed in less time than the construction of the Proposed Scheme and, whilst the Applicant has no plans to decommission and remove the Proposed Scheme, were it to be removed, it would be likely to require a similar degree of plant, equipment, and disturbance to that predicted during construction. It is considered that the potential sensitivity of receptors during decommissioning is likely to be similar to those during construction but with a lower magnitude of impact due to the shorter timeframe associated with any decommissioning. As described by technical topic in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** there are unlikely to be any new or different significant effects during decommissioning compared with those identified during construction, see **Chapter 5: Air Quality (Volume 1)** to **Chapter 21: Cumulative Effects (Volume 1)**, and in many cases the effects are likely to be of a lower significance than construction due to the anticipated lower magnitude of effects anticipated during decommissioning. In light of this and given that the Applicant has no plans to decommission the Proposed Scheme, further consideration of decommissioning is not considered appropriate, given that the potential for likely significant effects as a result of this phased of the Proposed Scheme are already considered via the assessment of impacts during the construction phase. A Demolition Environmental Management Plan will be prepared in advance of decommissioning commencing.

4.10.3. The design of the Proposed Scheme will continue to be progressed, requiring a certain level of flexibility to be maintained throughout the EIA process, including at this PEIR stage. Therefore, the principles of Planning Inspectorate Advice Note Nine[13] have been adopted to define the envelopes, parameters, or limits of deviation within which the construction and operation of the Proposed Scheme will be undertaken. These parameters will be defined within the application drawings and the draft DCO and are described within **Chapter 2: Site and Proposed Description (Volume 1)**.

4.10.4. **Figure 1-3: Indicative Site Layout Plan (Volume 2)** presents the zones of the Proposed Scheme. This plan has, and will continue, to inform the development of the envelopes, parameters, or limits of deviation within which the construction and operation of the Proposed Scheme will be undertaken.

4.10.5. The parameters approach presents the maximum envelope within which the built development may be undertaken. This ensures the assessment of environmental effects associated with the Proposed Scheme will be the worst-case, and that the actual development to be carried out within the defined parameters would be no worse than the effects reported in this PEIR or the subsequent ES. The detailed design and construction methodology for the Proposed Scheme will be developed within these parameters without the need for further assessment (though mitigation design approvals will be required to confirm assessment outcomes).

4.10.6. The following criteria will be considered when determining significance:

- likelihood of occurrence;
- geographical extent;
- adherence of the proposals to legislation and planning policy;
- adherence of the proposals to international, national and local standards;
- sensitivity of the receiving environment or other receptor;
- value of the receiving resource;
- whether the effect is temporary or permanent;
- whether the effect is short term, medium term or long term in duration; and
- whether the effect is reversible or irreversible.

4.10.7. The method for assessing the significance of an effect will vary between environmental topics, but in principle will be based on the environmental sensitivity (or value/importance) of a receptor and the magnitude of change from baseline conditions.

4.10.8. Guidance that requires topic specific criteria, or scales for determining significance, to be used will be presented in the relevant technical chapter of the ES. This is also outlined in the technical chapters (**Chapter 5: Air Quality (Volume 1)** to **Chapter 21: Cumulative Effects (Volume 1))** of this PEIR.

4.10.9. In the absence of topic specific guidance, both the magnitude of change and sensitivity (or value/importance) will be assessed on a scale of high; medium; low; and negligible. The significance of each effect will be assessed against the magnitude of change and the sensitivity (or value/importance) of the receptor or receiving environment using the matrix in **Table 4-2**.

4.10.10. Where a range is presented within **Table 4-2**, professional judgement will be used to define the significance of effect.

4.10.11. Only Moderate and Major effects are considered to be significant in EIA terms unless specified otherwise within the technical chapters of this PEIR.

4.10.12. Tables to summarise the likely significant effects will be provided within each technical chapter of the ES. These tables will outline sensitive receptors, mitigation measures and residual effects[c]. A distinction will be made in the tables between direct and indirect; short term, medium term, and long term; permanent and temporary; and beneficial and adverse[d] effects.

Table 4-2: Matrix of Determining Significance of Effect

		Sensitivity of Receptor/Receiving Environment to Change			
		High	**Medium**	**Low**	**Negligible**
Magnitude of Change	**High**	Major	Major to Moderate	Moderate	Negligible
	Medium	Major to Moderate	Moderate	Minor to Moderate	Negligible
	Low	Moderate	Minor to Moderate	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

4.10.13. In the absence of topic-specific guidance, the duration of an effect is considered to be:

- Temporary:
  - Short term: up to five years; or
  - Medium term: six to 10 years.
- Permanent:
  - Long term: over 10 years.

[c] Effects that would remain likely to occur if the Proposed Scheme were implemented and delivered, with all the mitigation measures identified.
[d] This terminology differs to that from the EIA Scoping Report[6] but has been applied consistently throughout this PEIR.

4.11. IN-COMBINATION CLIMATE CHANGE IMPACTS

4.11.1. An in-combination climate change impact assessment has been included within **Appendix 12-1: In-combination Climate Change Impacts Assessment (Volume 3)** to consider the extent to which climate change may alter the effects that have been identified through the assessment for each topic. This has been carried out in line with IEMA Guidance[14].

4.12. ASSESSMENT OF TRANSBOUNDARY IMPACTS

4.12.1. Regulation 32 of the EIA Regulations[2] sets out the procedural duties required where the SoS deems that a project being considered under the EIA Regulations is likely to have significant effects on the environment in a European Economic Area (EEA) State; or where an EEA State deems that its environment is likely to be significantly affected by a project being considered under the EIA Regulations. Further guidance is provided in Planning Inspectorate Advice Note 12[15].

4.12.2. The Applicant considers that transboundary impacts will not occur due to the localised physical nature of the works; and given that any emissions are unlikely to travel to any other EEA state from the Site. The Planning Inspectorate agreed with this approach as part of the Scoping Opinion[5] .

4.13. ASSESSMENT OF HEAT AND RADIATION

4.13.1. Schedule 4 of the EIA Regulations[2] requires consideration of the likely significant effects of the Proposed Scheme resulting from the emission of heat, light and radiation.

4.13.2. The Applicant considers that impacts from the emission of heat, light and radiation are not relevant to the Proposed Scheme as no significant sources of such emissions are anticipated. The Planning Inspectorate agreed with this approach as part of the Scoping Opinion[5] .

4.13.3. The effects of heatwaves, extreme weather and other external hazards are considered within **Chapter 20: Major Accidents and Disasters (Volume 1)** of this PEIR.

4.14. COORDINATION OF ASSESSMENTS

4.14.1. There are five other assessments that will be undertaken to support the application for development consent and submitted alongside the ES:

HABITATS REGULATIONS ASSESSMENT (HRA)

4.14.2. The overarching aim of the Habitats Regulations Assessment (HRA) is to determine, in view of a site's conservation objectives and qualifying interests, whether a plan or project, either in isolation and/or in-combination with other plans or projects ('inter-project'), could lead to adverse effects on the integrity of a National Network Site(s).

4.14.3. A report titled 'Information to Inform a Habitat Regulations Assessment: Stage 1 – Screening' was submitted to Natural England on 19th June 2023; provided at **Appendix 7-2: Information to Inform a Habitat Regulations Assessment: Stage 1 – Screening (Volume 3)** of this PEIR. Following engagement with Natural England, and ongoing development of the Proposed Scheme, an HRA comprising of Stage 2 - Appropriate Assessment will be prepared to accompany the application for development consent for the matters screened in by that Stage 1 report. The purpose of the Stage 2 document is to make an appropriate assessment of the likelihood of adverse effects on integrity arising as a result of the Proposed Scheme (and other schemes that could act in-combination with the Proposed Scheme ('inter-project')) on National Network Site(s) in view of its conservation objectives, and whether mitigation can ensure that adverse effects on integrity can be avoided. The Appropriate Assessment will also determine whether further HRA stages need to be applied to achieve compliance with legislation.

4.14.4. The assessment of inter-project effects through the HRA process will extend to a 15km Study Area, as described in **Chapter 7: Terrestrial Biodiversity (Volume 1)**. For the purposes of the inter-project effects for the cumulative effects assessment the Study Area will extend to 10km, as described in **Chapter 21: Cumulative Effects (Volume 1)**. Beyond the 10km Study Area the assessment of cumulative effects on these receptors will be considered in the HRA only given effects will be limited to ecology for that distance. The difference in the Study Areas does not affect the assessments presented within **Chapter 7: Terrestrial Biodiversity (Volume 1)** or **Chapter 21: Cumulative Effects (Volume 1)** of this PEIR or the assessments that will be presented in the ES.

4.14.5. However, whilst the over-arching objectives of EIA and HRA are similar, their scope, level of detail and terminology vary. As such, these processes will be undertaken separately. The scope presented within this PEIR has been developed cognisant of the needs of both processes to ensure a coordinated assessment overall.

BIODIVERSITY NET GAIN (BNG) ASSESSMENT

4.14.6. Following Defra's Biodiversity Metric (Version 4.0)[16], the BNG Assessment will analyse the habitats to be retained, enhanced, created, or lost within the Site. It will identify whether off-site habitat compensation is required and will demonstrate biodiversity benefits resulting from the Proposed Scheme.

WATER FRAMEWORK DIRECTIVE (WFD) ASSESSMENT

4.14.7. A Water Framework Directive (WFD) Screening Report was submitted alongside the EIA Scoping Report[6] that considered the potential for construction and operation impacts from the Proposed Scheme upon the relevant WFD quality elements, and the potential for impacts to the Thames Middle Water Body (water body ID: GB530603911402). This included identifying likely risks to: hydromorphology, biology, water quality, WFD protected areas and the spread of invasive non-native species.

4.14.8. In response to the Scoping Opinion[5] the Greenwich Tertiaries and Chalk Water Body WFD Groundwater Body (water body ID: GB40602G602500) will be included in the WFD impact assessment.

4.14.9. Ongoing engagement with the Environment Agency is being undertaken alongside ongoing design development, which will inform the scope of the WFD Assessment. The WFD Assessment will be presented as a technical appendix to Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES. The WFD Assessment will consider both the Thames Middle Water Body and the Greenwich Tertiaries and Chalk Groundwater Body. Further information on both of these waterbodies is presented in this **Chapter 11: Water Environment and Flood Risk (Volume 1)**.

FLOOD RISK ASSESSMENT (FRA)

4.14.10. A Flood Risk Assessment (FRA) will be prepared in accordance with NPS EN-1 (2011)[17], draft NPS EN-1 (2023)[18] and the National Planning Policy Framework (NPPF)[19]. The FRA will qualitatively assess the potential implications of the Proposed Scheme on flood risk to people and property elsewhere, as well as assessing the potential risk of flooding to the Proposed Scheme. Consultation on the scope of the FRA is ongoing with the EA.

PRELIMINARY NAVIGATIONAL RISK ASSESSMENT (PNRA)

4.14.11. The overarching aim of the pNRA is to determine, in view of the Proposed Scheme's location on the River Thames, whether the Proposed Scheme's marine infrastructure could lead to adverse effects on navigation within the river. The pNRA will consist of river navigation analysis, the identification of baseline risk controls, stakeholder engagement and risk assessments. **Chapter 19: Marine Navigation (Volume 1)** of this PEIR is based on the findings of the Preliminary Navigation Hazard Analysis which is presented as **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)**.

4.15. ASSUMPTIONS AND LIMITATIONS

4.15.1. At the time of preparing this PEIR the Proposed Scheme design continues to evolve. At the time of writing, it is recognised that:

- The Hydrogen Project component of the original Proposed Scheme has been removed and will not be considered further.
- The battery energy storage system component of the original Proposed Scheme has been removed and will not be considered further.
- The land requirements of the Proposed Scheme within the Site are yet to be wholly finalised.
- Areas for onsite and offsite mitigation and biodiversity net gain are yet to be wholly finalised.

4.16. REFERENCES

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[11] IEMA. (2015). 'IEMA EIA Guide to Shaping Quality Development'. Available at: https://www.iaia.org/pdf/wab/IEMA%20Guidance%20Documents%20EIA%20Guide%20to%20Shaping%20Quality%20Development%20V6.pdf

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[19] Ministry of Housing, Communities and Local Government. (2023). 'National Planning Policy Framework'. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

DECARBONISATION

CHAPTER 5: AIR QUALITY

Cory Decarbonisation Project

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5. AIR QUALITY

5.1. INTRODUCTION

5.1.1. This chapter reports the preliminary assessment of the likely significant effects of the Proposed Scheme on air quality during construction and operation and describes:

- relevant policy, legislation and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operational phase.

5.2. POLICY, LEGISLATION, AND GUIDANCE

5.2.1. The policy, legislation, and guidance relevant to the assessment of air quality for the Proposed Scheme is detailed in **Table 5-1: Air Quality Summary of Key Policy, Legislation and Guidance**.

Table 5-1: Air Quality Summary of Key Policy, Legislation and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011[1]	Sets out the Government's policy for delivery of major energy infrastructure and is currently the primary basis for decision making of applications within the Planning Act 2008 regime. NPS EN-1 requirements for air quality and emissions to air are broadly similar to those in the NPPF. Paragraph 5.2.8 states that significant air emissions and mitigation measures should be identified, distinguishing between stages of developments and including impacts from any road traffic. Furthermore, existing air quality levels and the relative change in air quality from these levels should be described, including potential eutrophication impacts. As in the NPPF[2], emphasis is placed on substantial weight being given to air quality considerations where developments would lead to a deterioration in an area or a new area where air quality already exceeds national air quality limits.
Draft Overarching National Policy Statement (NPS) for Energy EN-1 2023[3]	This Draft Overarching National Policy Statement for Energy (EN-1) is part of a suite of draft NPSs issued by the Secretary of State of DESNZ. It sets out the government's policy for delivery of major energy infrastructure and will

Policy, Legislation or Guidance	Description
	likely replace the 2011 NPSs by the time the application for the Proposed Scheme is submitted. EN-1 adds to its 2011 predecessor with the following paragraphs relating to the Applicant's assessment: • Paragraph 5.2.9 – "*Defra publishes future national projections of air quality based on estimates of future levels of emissions, traffic, and vehicle fleet. Projections are updated as the evidence base changes and the applicant should ensure these are current at the point of an application. The applicant's assessment should be consistent with this but may include more detailed modelling to demonstrate local impacts".* • Paragraph 5.2.10 – "*Where a Proposed Scheme is likely to lead to a breach of the air quality thresholds or affect the ability of a non-compliant area to achieve compliance within the timescales set out in the most recent relevant air quality plan at the time of the decision, the applicant should work with the relevant authorities to secure appropriate mitigation measures to ensure that those thresholds are not breached*". • Paragraph 5.2.11 – "*The Secretary of State should consider whether mitigation measures are needed both for operational and construction emissions over and above any which may form part of the project application. A construction management plan may help codify mitigation at this stage. In doing so the Secretary of State should have regard to the Air Quality Strategy or any successor to it and should consider relevant advice within Local Air Quality Management guidance".* • Paragraph 5.2.12 – "*The mitigations identified in Section 5.14 on traffic and transport impacts will help mitigate the effects of air emissions from transport".* Paragraph 4.11.10 is also important context given that the Proposed Scheme will seek an environmental permit, as it notes that: *"The Secretary of State should work on the assumption that the relevant pollution control regime and other environmental regulatory regimes, including those on land drainage, water abstraction and biodiversity, will be properly applied and enforced by the relevant regulator. The Secretary of State should act to complement but not seek to duplicate them."*

Policy, Legislation or Guidance	Description
National Planning Policy Framework (NPPF) 2023[2]	The NPPF sets out the Government's planning policies for England and how these should be applied, with the following paragraphs relating to air quality: • Paragraph 174 – "*Planning policies and decisions should contribute to and enhance the natural and local environment by … preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution".* • Paragraph 185 – "*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development".* • Paragraph 186 – "*Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objective for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan".* • Paragraph 188 – "*The focus of planning policies and decisions should be on whether Proposed Scheme is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.*"

Policy, Legislation or Guidance	Description
The London Plan 2021[4]	The Spatial Development Strategy for Greater London setting out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policy SI1 of the London Plan is the key policy specific to the air quality within Greater London. In summary, and in relation to the Proposed Scheme, it states that Proposed Schemes should not lead to further deterioration of existing poor air quality, create any new areas that exceed air quality limits or delay the date at which compliance with the limits are achieved. Design solutions should also be implemented to reduce exposure to poor air quality.
The Bexley Local Plan 2023[5]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development across the Borough. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. The local plan does not contain any specific policies related to air quality, noting that the intention to minimise air pollution is inherent throughout the Local Plan.
London Environment Strategy 2018[6]	The London Environment Strategy seeks to ensure that The London Environment Strategy contains the aim to ensure that *"London will have the best air quality of any major world city by 2050, going beyond the legal requirements to protect human health and minimise inequalities"*.
UK Air Quality Strategy[7]	The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales, and Northern Ireland (AQS). The AQS provides a framework for reducing air pollution in the UK with the aim of meeting the requirements of European Union legislation. The AQS sets out the following air quality objectives to be met (amongst others): • nitrogen dioxide (NO_2) – 40µg/m^3 annual mean, 200µg/m^3 hourly mean not to be exceeded more than 18 times a year; • particulate Matter (PM_{10}) – 40µg/m^3 annual mean, 50µg/m^3 daily mean not to be exceeded more than 35 times a year; and • particulate Matter ($PM_{2.5}$) – As per Environmental Improvement Plan 2023 below.

Policy, Legislation or Guidance	Description
Clean Air Strategy 2019[8]	This sets out measures that aim to reduce emissions from all sources of air pollution, making air healthier to breathe, protecting nature and boosting the economy. The Clean Air Strategy also proposes tough new goals to cut public exposure to airborne particulate matter (PM), as per the recommendation made by the World Health Organisation (WHO).
Environmental Improvement Plan 2023[9]	The Environmental Improvement Plan sets out the UK Governments visions at improving the environment in the UK. Goal 2: Clean Air specifies how the government will improve air quality in the UK by setting out targets that are presented in The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023[18]. These include an interim target for the $PM_{2.5}$ annual mean of 12 µg/m^3 by January 2028, and an annual mean $PM_{2.5}$ concentration target of 10 µg/m^3 by 2040.
South East Inshore Marine Plan 2021[10]	The South East Inshore Marine Plan area stretches from Felixstowe in Suffolk to west of Dover in Kent and incorporates the River Thames. It will help to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan area. Policy SE-AIR-1 states that "*Proposals must assess their direct and indirect impacts upon local air quality and emissions of greenhouse gases.*" In addition, Policy SE-AIR-1 advises that "*Proposals that are likely to result in increased air pollution or increased emissions of greenhouse gases must demonstrate that they will, in order of preference:* *a) avoid* *b) minimise* *c) mitigate* *air pollution and/or greenhouse gas emissions in line with current national and local air quality objectives and legal requirements.*"

Policy, Legislation or Guidance	Description
Legislation	
Environment Act 1995[11]	The Environment Act 1995 makes provision about targets, plans and policies for improving the natural environment. The Environment Act 1995 requires local authorities and other public bodies to review and document local air quality within their area. Where there are areas which do not meet the UK air quality standards, the relevant area is declared an Air Quality Management Area (AQMA), and an Air Quality Action Plan (AQAP) must be drawn up to secure improvements in air quality.
Environment Act 2021[12]	Creates the legislative framework by which statutory air quality targets are set by reference to plans such as the Environmental Improvement Plan 2021.
Environmental Protection Act 1990[13]	Section 79 – Control of Dust and Particulates Associated with Construction gives the following definitions of statutory nuisance relevant to dust and particles: • "*Any dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or a nuisance*"; and • *"Any accumulation or deposit which is prejudicial to health or a nuisance".* Following this, Section 80 says that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses. There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist. Whether a nuisance has arisen is contextual and requires having regard to the existing conditions and the change which has occurred.
Air Quality (England) Regulations 2000[14]	Many of the objectives in the AQS have been made statutory in England for the purpose of Local Air Quality Management (LAQM).
Air Quality Standards Regulations 2010, as amended in 2016[15]	The Air Quality Standards Regulations were derived from the European Union Ambient Air Quality Directive[16] and set legally binding thresholds for the concentration of pollutants in air for the protection of health and ecosystems. In the Standards Regulations the thresholds are referred to as 'limit values'. The limit values for NO_2 and PM_{10} are the same

Policy, Legislation or Guidance	Description
	concentration levels as the relevant AQS objectives and the limit value for $PM_{2.5}$ is a concentration of 25µg/m^3.
Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020[17]	Regulation 2 of the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 updated the Air Quality Standards Regulations 2010 to include a limit value of 20µg/m^3 for $PM_{2.5}$ from 2020. The limit values for NO_2 and PM_{10} remained the same concentration levels as the relevant AQS objectives.
The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023[18]	The legislation sets out targets to reduce concentrations of $PM_{2.5}$ to be equal to or less than 10µg/m^3 by 2040. It also states that exposure to $PM_{2.5}$ must be reduced by at least 35% by 2040.
Guidance	
National Planning Practice Guidance (2021)[19]	Explains the processes and tools that can be used through the planning system in England. Specific to air quality, it provides information on the types of assessment that may be required for new development as well as sources of information for planners.
London Local Air Quality Management Technical Guidance (LLAQM.TG(19)) 2019[20]	The Mayor of London has published guidance for use by the London Boroughs in their review and assessment work. This guidance, referred to in this document as LLAQM.TG(19), has been used where appropriate to define the proposed assessment methodology presented herein.
London Councils Air Quality and Planning Guidance 2007[21]	The guidance provides technical advice for developers, consultants and London local authorities on how to deal with a planning application in London that may have an impact on air quality.
IAQM/EPUK Land-use Planning and Development Control: Planning for Air Quality 2017[22]	Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) published guidance that offers comprehensive advice on: • when an air quality assessment may be required; • what should be included in an assessment; how to determine the significance of any air quality impacts associated with a development; and • the possible mitigation measures that may be implemented to minimise these impacts.

Policy, Legislation or Guidance	Description
IAQM Guidance on the Assessment of Dust from Demolition and Construction 2016[23]	This document was produced to provide guidance on how to assess the impacts arising from construction activities. The emphasis of the methodology is on classifying sites according to the risk of impacts (in terms of dust nuisance, PM_{10} impacts on public exposure and impact upon sensitive ecological receptors) and to identify mitigation measures appropriate to the level of risk identified.
The Control of Dust and Emissions During Construction – Supplementary Planning Guidance 2011[24]	The Mayor of London's Supplementary Planning Guidance (SPG) builds on the voluntary guidance published in 2006 by the London Councils to establish best practice in mitigating impacts on air quality during construction and demolition work. The SPG incorporates more detailed guidance and best practice and seeks to address emissions from Non-Road Mobile Machinery (NRMM) through a Low Emission Zone, which was introduced in September 2015 and expanded in August 2023. The SPG provides a methodology for assessing the potential impact of construction and demolition activities on air quality following the same procedure as set out in the IAQM construction dust assessment guidance. It then identifies the relevant controls and mitigation measures that should be put in place to minimise any adverse impacts, which need to be set out, in draft, in an air quality assessment report submitted with the planning application, and then formalised post submission as an Air Quality and Dust Management Plan. Details of site air quality monitoring protocols are also provided with varying requirements depending on the size of the site and the potential risk of adverse impacts.
Environment Agency Guidance of Air Emissions Risk Assessment 2021[25]	This Environment Agency guidance provides details on how to assess emissions for an environmental permit.
AQTAG06 Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air[26]	The AQTAG06 Guidance advises on carrying out the assessment of air quality impacts for Stage 3 appropriate assessment under the Habitats Regulations[27]. The Guidance sets out modelling methodologies for stacks and road sources as well as relevant dry deposition flux conversion factors for nitrogen deposition.

Policy, Legislation or Guidance	Description
Waste Incinerators: Guidance on Impact Assessment for Group 3 Metals Stack Emissions (2016)[28]	Provides details on how to assess group 3 metals from stack emissions from municipal waste incinerators and waste wood co-incinerators.
European Environment Agency Guidance 1.A.3.d[29]	Sets out methodologies on how to model air quality impacts from marine vessels.
London Plan Guidance – Air Quality Positive 2021[30]	The guidance provides examples and best practice to inform the preparation of statements for developments taking an Air Quality Positive approach. The approach seeks to maximise the benefits to local air quality in and around a development site and to minimise the exposure to existing sources of poor air quality. Full planning applications for developments subject to an EIA require an Air Quality Positive Statement which will be submitted as an appendix to the ES.
London Plan Guidance – Air Quality Neutral 2021[31]	The Air Quality Neutral planning guidance provides a methodology for assessing the air quality neutrality of development in London. It involves the calculation of Nitrogen Oxide (NO_x) and PM_{10} emissions for both transport and buildings sources and comparison of these against air quality neutral benchmarks, which are derived from information provided in the guidance for each planning land-use class. Developments that do not exceed these benchmarks (considered separately) are considered 'air quality neutral', whilst developments that exceed the benchmarks, after appropriate on-site mitigation measures have been incorporated, will be required to off-set any excess in emissions offsite.

5.3. SCOPING OPINION AND CONSULTATION

5.3.1. An EIA Scoping Opinion[32] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26th May 2023. The responses from the Planning Inspectorate and statutory consultees in relation to air quality and how these requirements should be addressed by the Applicant are set out in **Table 5-2** below.

Table 5-2: Summary of the EIA Scoping Opinion in relation to Air Quality

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
The Planning Inspectorate			
3.1.1	Operation phase impacts from: • Dust, Particulate Matter of less than 10 micrometres in diameter (PM_{10}) and Particulate Matter less than 2.5 micrometres in diameter ($PM_{2.5}$); and • emissions of Nitrogen Dioxide (NO_2), PM_{10} and $PM_{2.5}$ from non-road mobile machinery (NRMM)	"*The Inspectorate agrees that operational phase impacts from dust and emissions of NO_2, PM_{10} and $PM_{2.5}$ from any NRMM are not likely to result in significant effects. These matters can be scoped out of the ES*".	No response required.
3.1.2	Road traffic emissions of NO_2 and PM_{10} and $PM_{2.5}$ from the Carbon Capture Facility – operation phase	"*The Scoping Report proposes to scope out this matter on the basis that only occasional maintenance vehicle movements are anticipated for the CCS Project. The Inspectorate agrees that operational phase impacts from road traffic emissions of NO_2, PM_{10} and $PM_{2.5}$ from the CCS Project can be scoped out of the ES.* *The Inspectorate notes that road traffic emissions of NO_2, PM_{10} and $PM_{2.5}$ are scoped in for the operational phase of the Hydrogen Project (if this transport option is chosen)*".	As described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer included in the scope of the Proposed Scheme. Therefore, an assessment of operational road traffic emissions will not be undertaken.

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
3.1.3	Construction phase impacts from: • changes to emissions of Air Quality Strategy (AQS) pollutants and other pollutants, generated in Riverside 1 and Riverside 2 following the application of the Carbon Capture process; • emissions of new pollutants from Carbon Capture Facility; • emissions of Ozone (O_3) from the Hydrogen Project; and • emissions of NO_2, PM_{10} and $PM_{2.5}$ from new backup power generators (ancillary infrastructure and equipment).	"*The Inspectorate is content that these impacts are primarily related to operation of the Proposed Scheme and are not likely to result in significant effects during the construction phase. An assessment of these matters for the construction phase can be scoped out*".	No response required.

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
3.1.4	Emissions of toxic/ flammable gases from fires – construction phase	"*The Scoping Report explains that gasses that are released from battery energy storage systems are highly flammable and toxic and that following combustion, emissions could include particulate matter and other products of incomplete combustion. The Inspectorate agrees that fire risk from a battery energy storage system relates primarily to the operational phase. Therefore, the Inspectorate agrees that emissions of toxic/ flammable gases from fires during the construction phase can be scoped out of the ES*".	No response required.
3.1.5	Air Quality Neutral Assessment (AQNA) and Air Quality Positive Statement (AQPS) – construction phase	"*The Scoping Report explains that Policy S1 1 of the London Plan ('Improving Air Quality') states that "development proposals must be at least air quality neutral" and that the Greater London Authority sets out requirements for developments to demonstrate measures taken to achieve the best possible outcomes for air quality, known as Air Quality Positive. An AQNA and AQPS are proposed for the operational phase, but not for construction.* *The Scoping Report does not provide evidence that these requirements relate to operation only or provide justification for why such a consideration is not required and therefore, the Inspectorate is not in a position to scope out the need for an AQNA and AQPS relating to the construction phase.*	The Applicant will continue to engage with relevant consultation bodies to agree the scope of the AQNA and AQPS. Details of the engagement regarding the air quality assessment undertaken to date are presented in **Table 5-3**.

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
		The Applicant should make effort to discuss and agree the scope of the AQNA and AQPS with relevant consultation bodies. The findings of the AQNA and measures included in the AQPS should be described in the ES, where relevant to the assessment of likely significant effects".	
3.1.6	Road traffic emissions - construction and operational phases (if relevant Institute of Air Quality Management (IAQM) indicative criteria are not exceeded)	"*If the predicted numbers of construction or operational traffic movements generated by the Proposed Scheme alone or cumulatively would demonstrably not exceed the relevant indicative criteria for air quality assessment set out in the IAQM guidance, as relevant to each of the affected roads used for construction or operational traffic (once the route has been confirmed), the Inspectorate agrees that this matter can be scoped out of the ES.* *Where predicted construction or operational traffic flows meet the criteria, the Scoping Report confirms that this matter will be scoped into the ES*".	Construction traffic data will be screened against the relevant IAQM/EPUK criteria[22] set out in **Section 5.4**. The assessment of road traffic emissions will be presented in the ES. As described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer included in the scope of the Proposed Scheme. Therefore, an assessment of operational road traffic emissions will not be undertaken.
3.1.7	Stack parameters	"*A description of the methods used for determining stack height and diameter should be included within the ES, including any decisions regarding Best Available Techniques (BAT) and any sensitivity testing which has been undertaken. The ES should clearly explain the*	**Section 5.4** and **Appendix 5.2 Operational Phase Assessment (Volume 3)** provides modelling details regarding sensitivity testing around heights of the new Absorber

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
		assumptions that have been made in the air quality assessment regarding the number, placement, height and diameter of the stack(s) and the Applicant should ensure these parameters are reflected in the DCO".	Stack(s), technologies, diameters etc. The model input parameters will be updated for the ES to reflect the design development.
3.1.8	Baseline conditions	"*The ES should identify the locations of the local authority monitoring stations (continuous analysers) and proposed NO_2 diffusion tubes on a plan.* *In relation to the proposed NO_2 diffusion tubes and any other monitoring to be undertaken by the Applicant, the ES should include a justification for the monitoring locations and provide details of the monitoring method, sampling period, data capture and any adjustments applied to the data, such as diffusion tube bias adjustment factors.* *The ES should also consider any assumptions or limitations associated with any air quality and related data (for example traffic and transport) in relation to COVID-19 restrictions*".	The locations of local authority monitoring and the Applicant's monitoring are shown on **Figure 5-1: Air Quality Baseline (Volume 2)**. All justification surrounding the Applicant's air quality monitoring is provided in **Section 5.4**. **Section 5.6** of this chapter addresses the effect of the COVID-19 restrictions on air quality monitoring.
3.1.9	Study Areas	"*The Applicant should make effort to agree the study areas used in the assessment with relevant consultation bodies and these should be justified within the ES, with reference to relevant guidance and the extent of the likely impacts.* *The chosen study areas should be sufficient to encompass all routes and sensitive receptors on the local*	The chosen Study Areas have been taken from guidance including: • IAQM Dust Risk Assessment Guidance[23]; and • Environment Agency Guidance on Air Emissions Risk Assessment[25].

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
		road transport network and along the River Thames (including AQFAs and/ or AQMAs and their Action Plans) which could be significantly affected by changes in air quality from increased construction, operational and decommissioning road and vessel traffic emissions. *The Applicant's attention is drawn to comments from Dartford Borough Council in this regard (Appendix 2 of this Opinion)*".	The Applicant notes the comments provided by Dartford Borough Council with regards to the extent of the Study Areas for the air quality assessment and has referenced the Borough of Dartford within the air quality assessment presented in this technical chapter. This includes baseline concentrations presented in **Section 5.6** and the assessment of effects in **Section 5.8** of this chapter.
3.1.10	Sensitive receptors	"*The ES should identify the locations of sensitive receptors on appropriate plans*".	**Figure 5-2: Construction Dust Study Area (Volume 2)** and **5-3: Operational Study Area (Volume 2)** depict the locations of sensitive receptors.
3.1.11	Monitoring	"*The Applicant should set out in the ES any proposals for long term air quality monitoring of emissions from the Proposed Scheme, including any provision for potential remedial action. If monitoring would be undertaken as a condition of an environmental permit, this should be explained*".	The requirements for monitoring pollutants resulting from the incineration of waste are set out in the environmental permits for Riverside 1 and Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken). The monitoring of pollutants introduced by the Carbon Capture Facility will be set within the

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
			environmental permit for the Proposed Scheme.
3.1.12	Modelling	"*The Inspectorate notes that no specific details are given as to some of the parameters that are to be modelled in relation to air quality, as they are described as "AQS pollutants and other pollutants". The Applicant should make effort to agree the scope and methodology of air quality modelling for all relevant pollution sources with relevant consultation bodies*".	Details of the engagement regarding the air quality assessment undertaken to date are presented in **Table 5-3**. Engagement will continue as part of the EIA.
Dartford Borough Council			
N/A	N/A	*"There does not seem to be any reference to potential for air quality impacts and assessment of these within the Borough of Dartford. The Council consider that this is a significant omission given that impacts from both the plant/equipment itself and air quality impacts from traffic generation may have impacts within DBC's area. It should be noted that traffic (both construction and operational) that travels to/from the site using roads to the east, is likely to travel along Bob Dunn Way (within Dartford) to join the M25/A282 Dartford Crossing at junction 1a. Both Bob Dunn Way and the A282/M25 are designated as Air Quality Management Areas due to issues from existing traffic levels."*	This chapter sets out baseline conditions (**Section 5.6**) across the Study Area including Dartford, and including the relevant AQMA, AQFA and monitoring. The PEIR sets out the likely significant effects from changes to the emissions of pollutants from the incineration process (**Section 5.8**), both in terms of maximum impacts within the Study Area and as a function of the London boroughs within the Study Area (outlined in **Section 5.5**). The assessment of

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
			impacts from road traffic has been deferred to the ES.
		"At para 4.5.2 the report highlights sensitive receptors within 10km of the site and notes that given the size of this area, it is not possible to list all such sites. However, whilst sites up to 8.5km have been mentioned, there is no mention of sites within Dartford. There are residential properties in Burnham Rd, that are both within the AQMA and also close to the eastern route from the site to the A282/M25."	For the operational assessment, a 30km x 30km Study Area has been used and the potential for exposure was assumed to exist anywhere within this area. This covers all potential receptors within the borough of Dartford. **Section 5.4** sets out the key sensitive receptors for the assessment alongside that the potential for exposure of members of the public is assumed throughout the Study Area. The results of the assessment are presented in **Section 5.8**.
LBB			
		"The Council is satisfied that the applicant has adequately addressed the construction phase issues at this stage."	No response required.
		"The ES will need to reassess the impact on ground level concentrations made by the processes required for carbon capture process. This will inevitably reduce the temperature of the discharge and may also change the discharge height and efflux velocity. The ES should revisit the dispersion modelling carried out for the energy from	**Section 5.4** of the chapter sets out the methodology used to assess the impacts of the emissions from the incineration process. This includes consideration of the changes to the characteristics of the exhaust

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
		waste facilities, and properly assess the changes in plume dispersion and ground level concentrations that result. This assessment should include all emissions that were originally assessed when these facilities were first proposed."	plumes, existing pollutants and pollutants on the Riverside Campus that are introduced as a result of Proposed Scheme.
Metropolitan Police Service and the Mayor's Office for Policing and Crime			
N/A	N/A	*"MOPAC considers their facility to be a relevant sensitive commercial receptor although it is not specifically listed in paragraph 4.5.1 or 4.5.2 of the Scoping Report for the construction and operational air quality assessments. We request that the MOPAC facility is included as a sensitive receptor for operational as well as construction impacts, due to the presence of outdoor workshops and offices at the site, where exposure may occur on a regular basis".*	The air quality assessment of operational impacts presented in **Section 5.8** of this chapter considers the potential for exposure to air pollution at all locations within the Study Area. This includes the MOPAC facility.
		"The applicable legislation and proposed methods and tools for the air quality assessment of the proposed are considered appropriate i.e. Institute of Air Quality Management (IAQM) construction dust guidance, IAQM/Environmental Protection UK (EPUK) development control guidance, Environment Agency permitting guidance and the ADMS dispersion modelling software; this should be reviewed at the time the EIA is undertaken."	The most up to date guidance used for this chapter has been presented in **Section 5.2**. For quantitative modelling of operational impacts, the most up to date version of ADMS has been used (version 6.0).
		"Defra's recommendation in the draft revised Air Quality Strategy (AQS) (April 2023) is for new development to	Measures to minimise exposure to all air pollutants including $PM_{2.5}$ will be

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
		consider air quality upfront in design to deliver PM2.5 improvements. The assessment of this pollutant at EIA stage should not only relate to construction and operational emissions but also the potential to further mitigate impacts on local air quality through design. This should include consideration of alternatives to the standby diesel backup generators proposed, for which workers at the MOPAC facility are potentially relevant receptors. The design of the emissions from such generators should meet best practice to ensure effective dispersion."	incorporated into all aspects of the design of the Proposed Scheme. The detailed assessment of the emissions associated with back-up generators will be presented within the ES.
		"Future estimates of air quality for use in the assessment should be based on robust baseline monitoring data. Monitoring data for the year 2019 are more likely to provide a more conservative basis appropriate for DCO compared to 2021, which included periods of lockdown. Ratified/verified data for 2022 should be available by the time the air quality assessment is undertaken for the EIA and should also be considered. Local diffusion tube surveys for NO2 which may form the basis of model verification, should be carried out in line with Defra good practice guidance with consideration of accuracy/precision and bias adjustment. For short-term (< 6 months) surveys, it is best practice to set tubes up in triplicate."	**Section 5.6** discusses the exclusion of 2020 and 2021 monitoring data from the baseline section of the assessment. Five years of data up to 2019 has been presented to show the trends in air quality before the impact of Covid-19. A Proposed Scheme specific monitoring survey has been completed, using NO_2 diffusion tubes to aid model verification and further the understanding of the baseline air quality.

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
		"The construction phase of the proposed Cory Decarbonisation Project has the potential to generate dust and combustion emissions during the five-year construction period. We note that Table 4-2 of the scoping report refers to residential property only for the purposes of the dust risk assessment. The MOPAC Belvedere facility is within the IAQM construction dust study area of 350 m. While unlikely to be at a high risk of impact, we would nonetheless welcome its consideration at EIA stage. This is due to the potential for adverse impacts of dust on outdoor vehicle storage and roof mounted solar panels at the facility, as well as potential health effects on workers at the facility."	The construction dust assessment follows IAQM dust guidance[23] and considers all receptors within 350m of the Site Boundary. This includes the MOPAC Belvedere facility which under the guidance will be a medium sensitivity receptor to construction dust impacts. However, it is not necessary to list all receptors within this area.
		"The Scoping Report, paragraph 2.3.8, states that "Environmental mitigation required during construction will be recorded in an Outline Code of Construction Practice (OCoCP) to be submitted as part of the application for a DCO. A DCO requirement will ensure measures relevant to construction are included in a full Code of Construction Practice document (CoCP), to be prepared for the Proposed Scheme before construction commences. This CoCP will detail the environmental controls, environmental protection measures and safety procedures that will be adopted during construction. This will provide a tool to ensure the successful management of the likely environmental effects as a result of	Relevant construction dust mitigation has been set out in this chapter and will be updated in the ES where appropriate. The suggested mitigation includes the use of continuous dust monitoring.

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
		construction activities." We would expect to see appropriate dust mitigation and monitoring to be set out in a detailed dust management plan (DMP) to ensure no significant impacts on the buildings and occupants of the MOPAC facility during the construction phase."	
		"We note that impacts of emissions from road traffic, Non-Road Mobile Machinery (NRMM) and marine vessels during construction and/or operation will be considered, including PM2.5. We would welcome the quantitative assessment of construction as well as operational emissions, as this phase will last five years."	A quantitative assessment of vessel emissions for both construction and operation will be presented in the ES. For emissions from road traffic, traffic data will be screened against the relevant IAQM/EPUK guidance[22] criteria to determine whether a quantitative assessment is required or not. This will be presented in the ES. For NRMM, a qualitative assessment has been undertaken for this chapter as per the Scoping Report. The Planning Inspectorate has agreed that operation phase NRMM emissions can be scoped out of assessment.
		"Paragraph 17.6.1 states mitigation for the construction and operation phase "may include" a Construction Traffic Management Plan (CTMP) and Workplace Travel Plan	As per **Chapter 18: Landside Transport** (**Volume 1**) a Framework Construction Management Plan

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
		(WTP). Given the extended duration of the construction phase and the scale of Proposed Scheme, we would expect both to be produced; this should include detailed information on the traffic mitigation measures that are proposed to be implemented and how these will be effectively applied."	(FCTMP) will be developed, within which includes a Construction Workforce Travel Plan (CWTP), which includes but is not limited to establishing estimated quanta of vehicles, vehicle routing, demonstration of safe access and egress to site, vehicle movement timing restrictions and temporary parking restrictions.
		"The assessment of operational emissions will include the new CCS stack, as well as changes to the existing Riverside facilities. Table 4.2 is unclear in terms of the "other" (non AQS) pollutants that will be included in the assessment of operational emissions and whether this includes PM2.5. We note that the modelling will consider new pollutants such as amines and aldehydes, as well as standby plant emissions, and that the assessment will refer to the latest Environment Agency permitting guidance which is appropriate. *Consideration should also be given to any changes in stack gas parameters such as discharge temperature and/or velocity as a result of the CO2 absorption process which may change the effectiveness of dispersion in the local area."*	The methodology in this chapter (**Section 5.4** and **Appendix 5-2: Operation Phase Assessment (Volume 3)**) sets out the pollutants modelled in the assessment of the operation of the Carbon Capture Facility, including $PM_{2.5}$. In respect of the existing EfW facilities, whilst it is possible that some pollutants will be removed with the CO_2, to ensure a conservative assessment it is assumed that all pollutants are retained within the exhaust gases. As such, the same mass emission rates are assumed for these pollutants in both the baseline

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
			and with the Proposed Scheme scenarios. **Section 5.4** and **Appendix 5-2: Operation Phase Assessment (Volume 3)** of the chapter sets out the methodology used to assess the changes to existing emissions of existing pollutants resulting from the Proposed Scheme. The modelling considers changes in plume buoyancy as a result of the change in temperature of the plume and the removal of CO_2.
		"If the contaminated land risk assessment identifies the potential for Volatile Organic Compound (VOC) emissions from remediation areas, we would welcome monitoring of these pollutants at the site boundary to ensure human health effects from ambient air exposure are considered as well as potential odours."	Proposed Scheme specific monitoring undertaken for this chapter includes the use of NO_2 diffusion tubes. Further monitoring of other pollutants will be considered for the ES.
		"Regarding accidents with potential impacts on air pollution, it is currently unclear whether consideration will be made of the explosion risk of new infrastructure for CO2 and hydrogen compression/storage/pipelines."	Accidents are considered in **Chapter 20: Major Accidents and Disasters (Volume 2)**.

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
Natural England			
N/A	N/A	*"The planning system plays a key role in determining the location of developments which may give rise to pollution, either directly, or from traffic generation, and hence planning decisions can have a significant impact on the quality of air, water and land. The ES should take account of the risks of air pollution and how these can be managed or reduced. Further information on air pollution impacts and the sensitivity of different habitats/designated sites can be found on the Air Pollution Information System (www.apis.ac.uk)."*	**Section 5.4** sets out the methodology for the air quality assessment. Information on ecological sites was obtained from the Air Pollution Information System (APIS)[33] and from consultation with the project ecologists. This technical chapter presents the impacts on ecological sites from the changes to emissions of air pollutants as a result of the Proposed Scheme (**Section 5.8**).
		"Natural England has produced guidance for public bodies to help assess the impacts of road traffic emissions to air quality capable of affecting European Sites. Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations - NEA001. *Information on air pollution modelling, screening and assessment can be found on the following websites:* • *SCAIL Combustion and SCAIL Agriculture - http://www.scail.ceh.ac.uk/*	The assessment of road traffic emissions has been deferred to the ES.

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
		• *Ammonia assessment for agricultural development https://www.gov.uk/guidance/intensive-farming-risk-assessment-for-your-environmentalpermit* • *Environment Agency Screening Tool for industrial emissions https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmentalpermit* • *Defra Local Air Quality Management Area Tool (Industrial Emission Screening Tool) – England http://www.airqualityengland.co.uk/laqm"*	
UK Health Security Agency			
N/A	N/A	*"Our position is that pollutants associated with road traffic or combustion, particularly particulate matter and oxides of nitrogen are non-threshold; i.e., an exposed population is likely to be subject to potential harm at any level and that reducing public exposure to nonthreshold pollutants (such as particulate matter and nitrogen dioxide) below air quality standards will have potential public health benefits. We support approaches which minimise or mitigate public exposure to non-threshold air pollutants, address inequalities (in exposure) and maximise co-benefits (such as physical exercise). We encourage their consideration during development design, environmental and health impact assessment, and development consent."*	The potential for significant effects will be assessed following IAQM/EPUK guidance. This specifies that the assessment of significance considers not only the magnitude of the impacts but the extent of future exposure to the pollutants. Consideration of air quality impacts are included in the ongoing design development of the Proposed Scheme.

5.3.2. **Table 5-3** provides a summary of the consultations undertaken to inform the air quality assessment to date.

Table 5-3: Air Quality Consultation and Engagement Summary

Date and Method of Consultation	Consultee	Summary of Key Topics Discussed and Key Outcomes
23rd May 2023, Meeting	LBB	Presented the approach to the air quality assessment. LBB in agreement with the approach.

5.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

5.4.1. The air quality assessment of the Proposed Scheme has been undertaken in line with the legislation, policy and guidance described in **Section 5.2**.

POTENTIALLY SIGNIFICANT EFFECTS

5.4.2. As identified in the EIA Scoping Report[34], the following effects are considered to be significant and have been considered further in this assessment:

- Construction Phase:
  - impacts from dust, PM_{10} and $PM_{2.5}$;
  - emissions of NO_2, PM_{10} and $PM_{2.5}$ from operational NRMM;
  - road traffic emissions of NO_2, PM_{10} and $PM_{2.5}$; and
  - marine vessel emissions of NO_2, PM_{10} and $PM_{2.5}$.
- Operation Phase:
  - changes to emissions of AQS pollutants and other pollutants arising from the Riverside Campus as a result of the Carbon Capture Facility (herein referred to as ‘existing pollutants’);
  - emissions of NO_2, PM_{10} and $PM_{2.5}$ from new backup power generators (Ancillary Infrastructure);
  - marine vessel emissions of NO_2, PM_{10} and $PM_{2.5}$; and
  - Air Quality Neutral Assessment and Air Quality Positive Statement.

MATTERS SCOPED OUT

5.4.3. The following effects are considered unlikely to be significant, and therefore have not been considered further in this assessment:

- Operation:
  - Emissions of O_3 from the Hydrogen Project, as the Hydrogen Project is no longer included in the scope of the Proposed Scheme (as described in **Chapter 1: Introduction (Volume 1)**);
  - Emissions of O_3 from the Hydrogen Project, as the Hydrogen Project is no longer included in the scope of the Proposed Scheme; and
  - Emissions of toxic/flammable gases from fires, as described **in Chapter 1: Introduction (Volume 1)**, the battery energy storage system is no longer included as part of the Proposed Scheme.

SENSITIVE RECEPTORS

5.4.4. Given the urban setting of the Proposed Scheme, the assessment of impacts is undertaken on the assumption that there is the potential for exposure for members of the public (sensitive receptors) to air pollutants across the entire the Study Area (set out in **Section 5.5**). As such, maximum impacts will be reported for any location within the Study Area. Notwithstanding this the following key sensitive human receptors have been identified (distances are measured from the Site Boundary):

- Residential properties including:
  - Clydesdale Way (approximately 110m to the southeast);
  - North Road (approximately 200m to the southeast);
  - Norman Road (approximately 200m to the south); and
  - Poppy Close (approximately 200m to the south).
- Hospitality facilities including:
  - Travelodge London Belvedere (approximately 55m to the east);
  - Morgan Pub (approximately 35m to the south); and
  - Starbucks Norman Road (approximately 110m to the south).
- Places of work including:
  - Riverside 1 and Riverside 2 (within the Site Boundary);
  - Munster Joinery (within the Site Boundary);
  - Iron Mountain Records Storage Facility (adjacent east);
  - Asda Belvedere Distribution Centre (adjacent east);
  - Lidl Warehouse/Belvedere Regional Distribution Centre (adjacent south); and
  - Users of the PRoW, Crossness LNR and Metropolitan Open Land (within the Site Boundary).

- Schools including:
  - Harris Garrard Academy (approximately 0.7km to the southwest);
  - Belvedere Junior and Infant School (approximately 0.7km to the south);
  - Northwood Primary School (approximately 1km to the southwest);
  - Parkway Primary School (approximately 1.2km to the southwest); and
  - Harris Academy Rainham (approximately 2.7km to the southwest).
- Hospitals including:
  - Queen Elizabeth Hospital (approximately 7km to the southwest);
  - Queens Hospital (approximately 7.2km to the north);
  - Newham University Hospital (approximately 7.8km to the west); and
  - King George Hospital (approximately 8.5km to the north).

5.4.5. The following internationally designated ecological sites have been identified (distance are measured from the Site Boundary):

- Epping Forest Special Area of Conservation (approximately 11.8km to the north west).

5.4.6. The following nationally designated ecological sites have been identified:

- Inner Thames Marshes SSSI (approximately 0.9km to the east);
- Abbey Wood SSSI (approximately 1.6km to the southwest);
- Ingrebourne Marshes SSSI (approximately 2.3km to the northeast);
- Oxleas Woodlands SSSI (approximately 5.9km to the southwest);
- West Thurrock Lagoon and Marshes SSSI (approximately 8.0km to the southeast);
- Ruxley Gravel Pits SSSI (approximately 9.8km to the south); and
- Medway Estuary MCZ (approximately 10km to the southeast).

5.4.7. The following locally designated ecological sites have been identified (distance are measured from the Site Boundary):

- Crossness LNR (within the Site Boundary);
- Erith Marshes SINC (within the Site Boundary);
- Belvedere Dykes SINC (within the Site Boundary);
- River Thames and Tidal Tributaries SINC (within the Site Boundary);
- Dagenham Breach and the lower Beam River in Dagenham SINC (500m to the north);
- Lower River Beam and Ford Works Ditches SINC (500m to the north);
- Southmere Park & YarntonWay/Viridion Way SINC (700m to the southwest);
- Crossness Sewage Treatment Works Pond SINC (900m to the west);
- Rainham Marshes Local Nature Reserve (approximately 0.9km to the east);

- Lesnes Abbey Woods Local Nature Reserve and Ancient Woodland (approximately 1.1km to the southwest);
- Franks Park Belvedere SINC (1km to the south);
- Wennington, Aveley and Rainham Marshes SINC (1km to the east);
- Lesnes Abbey Woods and Bostall Woods SINC (1.2km to the southwest);
- Thamesview Golf Course SINC (1.2km to the west);
- Riverside Sewage Treatment Works SINC (1.2km to the northeast);
- Mudlands SINC (1.5km to the north);
- St John the Baptist Churchyard, Erith SINC (1.5km to the southeast);
- Crossway Park and Tump 52 SINC (1.5km to the west);
- The Ridgeway SINC (1.5km to the west);
- Crossways Lake Nature Reserve and Thameside Walk Scrub SINC (1.6km to the west);
- Hollyhill Open Space SINC (1.8km to the south);
- Rainham Railsides SINC (1.8km to the north);
- Goresbrook and the Ship & Shovel Sewer SINC (2km to the northwest); and
- Streamway, Chapman's Land and Erith Cemetery SINC (2km to the south).

BASELINE DATA COLLECTION

5.4.8. The key sources of information used to determine the baseline air quality conditions are:

- National pollutant concentration mapping for nitrogen oxides and particulate matter, available from the Defra website[35];
- National pollutant concentration data for ammonia and sulphur dioxide, and deposition mapping for nitrogen and acid, available from UK Centre for Ecology & Hydrology[33];
- LAQM monitoring and reporting from Local Authorities including the London Borough of Bexley (LBB)[36], Dartford Borough Council (DBC)[37], the London Borough of Barking and Dagenham (LBBD)[38], the Royal Borough of Greenwich (RBG)[39] and the London Borough of Havering (LBH)[40];
- UK's national monitoring networks, managed by the Environment Agency on behalf of Defra and the Devolved Administrations, with data available from Defra's UK Air Information Resource Website[41];
- Peer reviewed literature focussed on atmospheric chemistry relating to amine reaction schemes;
- The Multi Agency Geographic Information System Mapping (MAGIC)[42]; and
- Proposed Scheme specific air quality monitoring undertaken by the Applicant (as detailed in **Section 5.6**).

CONSTRUCTION PHASE ASSESSMENT METHODOLOGY

Impacts of Dust and PM_{10} and $PM_{2.5}$

5.4.9. Activities in the construction phase of the Proposed Scheme may result in the generation of fugitive dust emissions which, if transported beyond the Site, can have adverse impacts on local air quality.

5.4.10. Dust comprises of particles typically sized between 1-75 micrometres (µm) in aerodynamic diameter. Dust is created through the action of crushing and abrasive force on materials. Larger dust particles typically fall out of the atmosphere quickly after the initial release and therefore tend to be deposited in relative proximity to the source of the dust emission. As such, dust is unlikely to cause widespread or long-term changes to local air quality, but its deposition on property can cause "soiling". This may result in nuisance complaints through amenity loss or perceived damaged caused, which is usually temporary.

5.4.11. The smaller particles of dust (not exceeding 10µm in aerodynamic diameter) are known as PM_{10} and represent only a small proportion of the total dust released. Within PM_{10} there is a finer fraction, known as $PM_{2.5}$ (with an aerodynamic diameter not exceeding 2.5µm).

5.4.12. PM_{10} and $PM_{2.5}$ are the smaller end of the size range of dust particles and can remain suspended in the atmosphere for a longer period of time than larger particles and, therefore, can be transported by wind over a winder area. PM_{10} and $PM_{2.5}$ are small enough to be drawn into the lungs during respiration, which can have a potential impact on the health of sensitive members of the public. However, ambient dust emissions from construction activities will be as PM_{10} and predominantly in the coarse fraction ($PM_{2.5-10}$) rather than in the $PM_{2.5}$ are fraction[23]. As such, the construction phase dust assessment focuses on levels of PM_{10} with respect to human receptors.

5.4.13. An assessment of the likely significant impacts on local air quality due to the generation and dispersion of dust and PM_{10} during the construction phase has been undertaken with reference to: the Mayor of London's SPG[24] for the control of dust and emissions during construction and demolition; the available information for this phase of the Proposed Scheme; and, professional judgement. The Mayor of London's SPG[24] requires a Dusk Risk Assessment to be undertaken following the methodology published by the IAQM[23].

5.4.14. The IAQM Construction Dust[23] guidance methodology assesses the risk of potential dust and PM_{10} impacts from the following four sources:

- Demolition: any activity involved with the removal of any existing structures.
- Earthworks: the processes of soil-stripping, ground-levelling, excavation and landscaping.
- Construction: any activity involved with the raising of a new structure(s) (including building, road, etc), its modification or refurbishment.
- Track-out: the transport of dust from a site onto the public road network where it may be deposited and subsequently re-suspended by vehicles using the network. Track-out arises when heavy duty vehicles (HDV) leave a site with dusty materials which may then spill onto the road, and/or when HDV transfer dust onto the road network after travelling within a site.

5.4.15. The IAQM Construction Dust[23] guidance methodology takes into account the nature and scale of the activities undertaken for each source and the sensitivity of the area to an increase in dust and PM_{10} levels to assign a level of risk. Risks are described in terms of there being a low, medium or high risk of dust impacts. Once the level of risk has been ascertained, then site specific mitigation proportionate to the level of risk is identified, and the significance of residual effects determined. A summary of the IAQM assessment methodology is provided in **Appendix 5-1: Construction Dust Assessment (Volume 3)**.

Emissions of NO_2, PM_{10} and $PM_{2.5}$ from Operation of NRMM

5.4.16. In addition to impacts on local air quality due to on-site construction activities, exhaust emissions from construction vehicles and plant may have an impact on local air quality adjacent to the routes used by these vehicles to access the Site and in the vicinity of the Site itself. A qualitative assessment of their impact on local air quality has been undertaken using professional judgement and by considering the following:

- The number and type of construction traffic and plant likely to be required (information by the construction traffic information presented in **Chapter 18: Landside Transport (Volume 1)** and plant type presented in **Chapter 6: Noise and Vibration (Volume 1)**).
- The number and proximity of sensitive receptors to the Site and along the likely routes to be used by construction vehicles.
- The likely duration of the construction phase and the nature of the construction activities undertaken (information by the indicative construction programme[a] and construction activities described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**).

[a] The construction assessment presented in this chapter is appropriate for both construction programme options, as set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1).**

Road Traffic Emissions of NO_2, PM_{10} and $PM_{2.5}$

5.4.17. **Chapter 18: Landside Transport (Volume 1)** presents a peak estimate of road traffic movements to/ from the Proposed Scheme during the construction phase. As part of the design evolution a profile of road traffic movements to/ from the Proposed Scheme for each year of the construction phase will be developed. This information will be used to screen for the requirement for a quantitative assessment of impacts (using IAQM/EPUK guidance[22]). Should a modelling assessment be required, the data in the form of annual average traffic flows will be used and the model results will be presented in the ES.

5.4.18. It is likely that the following scenarios will be modelled using ADMS Roads v5.0[43]:

- Model verification and baseline;
- Future Year Without construction traffic; and
- Future Year With construction traffic.

5.4.19. The traffic data provided will likely include Annual Average Daily Traffic (AADT), vehicle speeds (kph) and the percentage of HDV for the local road network in all assessment years considered. For the construction scenario it is assumed that the peak construction year (2028) will be used to determine the AADT, HDV percentage and speeds.

5.4.20. Vehicle emission factors to be used in the assessment will be obtained using Defra's Emission Factors Toolkit (EFT) version 11.0[44]. The EFT allows for the calculation of emission factors arising from road traffic for all years between 2018 and 2030. For the predictions of future year emissions, the toolkit takes into account factors such as anticipated advances in vehicle technology and changes in vehicle fleet composition, such that vehicle emissions are assumed to reduce over time.

5.4.21. Background pollutant concentrations will be taken from Defra's background mapping[35].

5.4.22. The ADMS Roads dispersion model[43] has been widely validated for this type of assessment and is considered to be fit for purpose. Model validation undertaken by the software developer will not have included validation in the vicinity of the Proposed Scheme.

5.4.23. To determine model performance at a local level, a comparison of modelled results with the results of monitoring carried out within the Study Area (detailed in **Section 5.5**) will be undertaken. This process of verification aims to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results; it will be carried out following the methodology specified in Chapter 7, Section 4, of LAQM.TG(19)[20].

5.4.24. The verification factors will be applied to modelled road-NO_X outputs prior to conversion to NO_2 concentrations utilising Defra's NO_X to NO_2 calculator (version 8.1)[45].

Marine Vessels Emissions of NO_2, PM_{10} and $PM_{2.5}$

5.4.25. This part of the assessment will be presented in the ES as a result of ongoing design development. A quantitative assessment will be undertaken utilising the ADMS model (v6.0) published by Cambridge Environmental Research Consultants (CERC)[46].

5.4.26. The model will be set-up to replicate the movements of the various marine vessels associated with the construction of the Proposed Scheme.

5.4.27. The assessment of emissions will use the methodology proposed by European Environment Agency guidance[29] in which detailed methodologies for calculating emissions, specifically from shipping, are presented. The guidance adopts a tiered approach, with increasing sophistication, to inventory generation, as follows:

- Tier 1 – uses default emission rates based on fuel consumption;
- Tier 2 – emission rates based on fuel consumption and engine types in the fleet; and
- Tier 3 – emission rates for vessel movements stratified by engine technology either as mass/kWh or mass/hr.

5.4.28. It is assumed that Tier 3 will be the adopted methodology.

5.4.29. The assessment will use five years of recent meteorological data obtained from London City Airport to assess the impacts from marine vessels on a worst-case basis.

OPERATION PHASE ASSESSMENT METHODOLOGY

Changes To Emissions of Pollutants (arising from the Riverside Campus as a result of the Carbon Capture Facility)

5.4.30. The assessment of emissions from the Proposed Scheme is based on a dispersion modelling exercise undertaken using the ADMS model (v6.0)[46]. The model has been validated against both field studies and wind tunnel studies of dispersion and is widely used for air quality impact assessment in the UK.

5.4.31. The atmospheric dispersion model considers the effects of terrain, roughness length and buildings (as appropriate for the location), together with, in accordance with Environment Agency guidance[25], five years of recent meteorological data from London City Airport. The model also has an in built amine chemistry module that was used in the assessment.

5.4.32. The air pollutants assessed as part of the operation phase air quality assessment comprise:

- Oxides of nitrogen (NO_X);
- Particulate matter (capturing both PM_{10} and $PM_{2.5}$);
- Hydrogen chloride (HCl);
- Hydrogen fluoride (HF);
- Sulphur dioxide (SO_2);
- Ammonia (NH_3);
- Heavy metals; and
- Pollutants introduced by the carbon capture process:
  - Amine and degradation products; and
  - Aldehydes.

5.4.33. Details of the adopted atmospheric dispersion modelling approach, including the treatment and assessment of amine and nitrosamine emissions, are provided in **Appendix 5-2: Operation Phase Assessment (Volume 3)**. However, key information relating to the dispersion modelling methodology is summarised in the subsections below.

Modelled Scenarios

5.4.34. The air quality assessment for the operation phase of the Proposed Scheme has focussed on the following scenarios:

- Baseline:
  - Continuous operation of Riverside 1 and Riverside 2 with the incineration of 850,000 and 805,920 tonnes of waste per annum (tpa) respectively (the current maximum permitted operating regime – there is no change to performance as a result of the application of the carbon capture process) respectively.
- With Proposed Scheme:
  - Continuous operation of Riverside 1 and Riverside 2 as above with the Carbon Capture Facility.

5.4.35. The impact of the Proposed Scheme is taken to be the difference between these scenarios (i.e., Proposed Scheme minus Baseline).

Modelled Absorber Stack Parameters

5.4.36. The modelled stack parameters for the two new Absorber Stacks are provided in **Appendix 5-2: Operation Phase Assessment (Volume 3)**. The flue discharge conditions are based on maximum permitted operations at Riverside 1 and Riverside 2 both with and without the Carbon Capture Facility.

5.4.37. For pollutants associated within the incineration of waste (existing emissions), all pollutant emissions are based on current emission limit values as per the existing environmental permit conditions for Riverside 1 and Riverside 2. The carbon capture process is assumed to make no difference to the mass emission rates of these pollutants. The impacts of the Proposed Scheme on these pollutants relates to changes to the plume buoyancy and release locations only.

5.4.38. A technology supplier has not yet been selected for the carbon capture process. Consequently, the post carbon capture exhaust gas parameters and pollutant emissions (amines, nitrosamines, aldehydes) are based on indicative parameters derived from information provided by candidate suppliers.

5.4.39. Emissions of amines and nitrosamines associated with the loss of solvents (and their subsequent degradation) from the carbon capture process (the flue gases) are modelled using monoethanolamine (MEA) and dimethylamine (DMA) as indicative emissions of primary and secondary amines respectively. Primary amines do not form stable nitrosamines and, therefore, direct emissions of nitrosamines are modelled as N-nitrosodimethylamine (NDMA), which is the nitrosamine formed by the degradation of DMA.

5.4.40. For the purpose of the comparison of impacts with the associated non-statutory Environmental Assessment Levels (EAL) set by the Environment Agency (**Table 5-5** below), all amine concentrations are assessed against the EAL for MEA; whilst all nitrosamine and nitramine concentrations are assessed against the EAL for NDMA. Aldehydes are assessed against the EAL for formaldehyde.

5.4.41. **Appendix 5-2: Operation Phase Assessment (Volume 3)** contains further details on the atmospheric dispersion model input parameters, assumptions and limitations, post-processing of model outputs and associated sensitivity testing that has been completed to inform this technical chapter or will be completed and presented in the ES.

Model Outputs

5.4.42. The processed model outputs comprise concentration data for each pollutant and the respective short term (e.g., 15min, hourly, daily) and long term (annual) averaging periods at all gridded receptor locations (human and ecological). These outputs are provided for each of the modelled five years (2018-2022 inclusive), thereby allowing the maximum value at each receptor to be reported over this period. The relevant averaging periods specific to each assessed pollutant are provided in **Table 5-5** and **Table 5-6** below for ecological receptors.

5.4.43. In addition to modelling concentrations of each pollutant, the assessment of nutrient nitrogen deposition and acid deposition at identified sensitive ecological habitats, associated with emissions from each modelled scenario, has adhered to Environment Agency guidance[25]. For nitrogen-containing pollutants not included within this guidance (i.e., amines, nitrosamines, nitramines), a deposition velocity equivalent to that for ammonia has been used, which is based on relevant research[47], and is considered to be conservative (see **Appendix 5-3: Detailed Model Pollutant Results (Volume 3)**).

5.4.44. Background pollution and nitrogen/acid deposition levels for each relevant compound, where available, have been obtained from national mapping data provided by Defra[35] and the Air Pollution Information System (APIS)[41] for human and ecological receptors respectively. These are reported in **Section 5.4**.

5.4.45. The quantified impacts associated with the Process Contribution (PC) (i.e., the pollutant concentration resulting from the Baseline scenario and the Proposed Scheme) and the Predicted Environmental Concentration (PEC) (i.e., the PC plus background concentration or deposition for each scenario) have been assessed in relation to the following standards:

- Statutory ambient air quality standards for both human and ecological receptors (see **Section 5.2**);
- Non-statutory EAL set by the Environment Agency (see **Section 5.2**); and
- Non-statutory critical levels and critical loads for ecological receptors, taken from the APIS website[41] (see **Table 5.9** below).

5.4.46. This assessment has accounted for the PC and PEC relating to the operation of the Proposed Scheme alone. The impact of the Proposed Scheme represents the change in concentration/deposition between the Baseline scenario PC and Proposed Scheme scenario PC. The assessment of cumulative impacts, whereby the PC from the Proposed Scheme is added to relevant PC from qualifying developments within the Study Area will be presented in the ES.

Emissions of NO_2, PM_{10} and $PM_{2.5}$ from New Backup Power Generators (Ancillary Infrastructure)

5.4.47. A screening exercise will be undertaken for the ES. It will likely review the following information as to whether quantitative assessment is required or not:

- scenarios for operation;
- testing frequency in hours per year;
- output of plant in MW;
- emission concentrations of NO_X, PM_{10} and $PM_{2.5}$;
- reference O_2 concentration;
- release height; and
- release diameter.

5.4.48. If quantitative assessment is required, the ADMS v6.0 model will be used to model the operation of the backup power generators during both testing and during a power supply failure. The model will be run for five meteorological years (2018 – 2022 inclusive) to account for the worst-case impact for NO_X, PM_{10} and $PM_{2.5}$.

Marine Vessel Emissions of NO_2, PM_{10} and $PM_{2.5}$

5.4.49. The methodology for this part of the assessment will largely follow that of the construction phase described above, only with operational vessel movements.

5.4.50. The results of the assessment will be presented in the ES.

Air Quality Neutral Assessment and Air Quality Positive Statement

5.4.51. The current methodology for achieving a standard of Air Quality Neutral is based on a series of benchmarks for emissions of NO_X and PM_{10} from buildings (e.g., energy provision) and transport. There are no applicable benchmarks for an industrial development such as the Proposed Scheme, therefore, an Air Quality Neutral Assessment is not required.

5.4.52. Notwithstanding this, the principal source of emissions from the Proposed Scheme are combustion gases from the incineration of waste. The Proposed Scheme will not change the emissions of NO_X and PM_{10} from Riverside 1 and Riverside 2 and is therefore inherently Air Quality Neutral.

5.4.53. Regarding Air Quality Positive, the Proposed Scheme has been designed to minimise its impact on local air quality, in particular the design of the two new Absorber Stacks has been optimised to achieve the best possible outcomes for air quality. This is set out in **Appendix 5-2: Operation Phase Assessment (Volume 3)**. A formal statement setting out the evidence base for the design measures incorporated in the Proposed Scheme to satisfy the requirements for Air Quality Positive will be provided as a technical appendix to the ES.

SIGNIFICANCE CRITERIA

Impacts of Dust, PM_{10} and $PM_{2.5}$

5.4.54. The matrix for determining significant effects for the construction dust assessment is shown in **Chapter 4: EIA Methodology (Volume 1)** and shows the defined descriptors for magnitude of impact (degree of change) and sensitivity of the receptor.

5.4.55. For the purpose of the construction dust assessment, the IAQM dust guidance[23] is not directly comparable given the nature of the Proposed Scheme and so professional judgement has been used to determine the significance of effects for dust soiling, human health and ecological sites.

IAQM/EPUK Significance Criteria

5.4.56. The significance criteria set out below applies to the following potentially significant effects:

- Construction Phase:
  - emissions of NO_2, PM_{10} and $PM_{2.5}$ from operational NRMM;
  - road traffic emissions of NO_2, PM_{10} and $PM_{2.5}$; and
  - marine vessel emissions of NO_2, PM_{10} and $PM_{2.5}$.
- Operation Phase:
  - changes to emissions of existing pollutants (generated in Riverside 1 and Riverside 2 following the application of the carbon capture process) and emissions of new pollutants from the Carbon Capture Facility;
  - emissions of NO_2, PM_{10} and $PM_{2.5}$ from new backup power generators (Ancillary Infrastructure); and
  - marine vessel emissions of NO_2, PM_{10} and $PM_{2.5}$.

Human Receptors

5.4.57. For long term (annual mean) pollutant concentrations, the IAQM/EPUK guidance[22] recommends that the degree of an impact is described by expressing the magnitude of incremental change in pollution concentration as a proportion of the relevant Air Quality Assessment Level (AQAL) and examining this change in the context of the new total concentration and its relationship with the assessment criterion. This is summarised in **Table 5-4**.

Table 5-4: Air Quality Impact Descriptors Relating to Individual Receptors (Human)

Long term Average Concentration at Receptors in Assessment Year	% Change in Concentration Relative to AQAL			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76 – 94% AQAL	Negligible	Slight	Moderate	Moderate
95 – 102 of AQAL	Slight	Moderate	Moderate	Substantial
103 – 109 % of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Long term Average Concentration at Receptors in Assessment Year	% Change in Concentration Relative to AQAL			
	1	2-5	6-10	>10

Notes:

AQAL = Air Quality Assessment Level, which for this assessment related to the UK Air Quality Strategy objectives and non-statutory EALs for human health.

Where the %change in concentrations is <1%, the change is described as 'negligible' regardless of the concentration. For this assessment, this is interpreted as a %change <1.0% (rounded to 1dp) for compatibility with Environment Agency guidance[25].

When defining the concentration as a percentage of the AQAL, 'without scheme' (baseline) concentration should be used where there is a decrease in pollutant concentration and the 'with scheme' (Proposed Scheme) concentration where there is an increase.

Where concentrations increase, the impact is described as adverse, and where it decreases as beneficial.

5.4.58. The IAQM/EPUK impact descriptors[22] are used as the starting point to make a judgement on significance of effects, since other impacts/effects may be important. The IAQM/EPUK[22] guidance states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including the:

- existing and future air quality in the absence of the Proposed Scheme;
- extent of current and future population exposure to the impacts; and
- influence and validity of any assumptions adopted when undertaking the prediction of impacts.

5.4.59. The IAQM/EPUK guidance[22] states that for most road transport related emissions, long-term average concentrations are the most useful for evaluating the severity of impacts. For short term (sub-hourly, hourly and daily averages) pollutant concentrations from sources such as the Proposed Scheme ('point' sources), the IAQM/EPUK guidance[22] recommends that the impact is described with reference to the magnitude of the impact from the process without consideration of the background concentrations. This assumes that the background concentrations will be smaller than the peak concentrations caused by a substantial plume. Where the impact is ≤10% of an AQAL, it is negligible; impacts in the range 11-20% are slight, 21-50% are moderate and those ≥51% are substantial.

5.4.60. As a precautionary approach, both long-term and short-term average concentrations have been considered with respect to judging likely significant effects as part of this assessment.

5.4.61. The AQAL for the assessment are derived from UK air quality regulations[14] or, where statutory standards do not exist, Environment Agency EAL[25].

Table 5-5: Air Quality Assessment Levels for Human Health

Pollutant	Averaging Period	Concentration ($\mu g/m^3$)	Permitted Exceedances per Year	Statutory
NO_2	1hr	200	18	Y
	Annual	40	-	Y
PM_{10}	Daily	50	35	Y
	Annual	40	-	Y
SO_2	15min	266	36	Y
	1hr	350	18	Y
	24hr	125	3	Y
CO	8hr	10000	-	Y
HF	1hr	160	-	-
HCl	1hr	750	-	-
	Annual	16	-	-
NH_3	1hr	2500	-	-
	Annual	180	-	-
Arsenic	Annual	0.006	-	-
Cadmium	Annual	0.005	-	-
Lead	Annual	0.25	-	Y
Nickel	Annual	0.02	-	Y
Antimony	1hr	150	-	-
	Annual	5	-	-
Chromium III	1hr	150	-	-
	Annual	5	-	-
Chromium VI	Annual	0.00025	-	-
Copper	1hr	200	-	-

Pollutant	Averaging Period	Concentration (µg/m^3)	Permitted Exceedances per Year	Statutory
	Annual	10	-	-
Manganese	1hr	1500	-	-
	Annual	0.15	-	-
Mercury	1hr	7.5	-	-
	Annual	0.25	-	-
Vanadium	24 hr	1	-	-
MEA	1hr	400	-	-
	24 hr	100	-	-
NDMA	Annual	0.0002	-	-
Formaldehyde	1hr	100	-	-
	Annual	5	-	-

Ecological Receptors

5.4.62. Following Environment Agency guidance[25], impacts will be screened against the following criteria:

- the short-term PC is less than 10% of the short-term environmental standard for the ecological receptor; and
- the long-term PC is less than 1% of the long-term environmental standard for the ecological receptor.

5.4.63. If the above criteria are not met, additional criteria are applied as follows:

- if the short-term PC exceeds the above screening criteria, significant effects cannot be screened out and further assessment is needed; or
- if the long-term PC is greater than 1% and the PEC is less than 70% of the long-term environmental standard, the emissions are insignificant, and no further assessment is required; or
- if the PEC is greater than 70% of the long-term environmental standard, significant effects cannot be screened out and further assessment is needed.

5.4.64. The significance of effects on ecological receptors is assessed within **Chapter 7: Terrestrial Biodiversity (Volume 1)**.

5.4.65. The assessment standards for ecological receptors are set out in **Table 5-6** below. For SO_2, NH_3 and nitrogen and acid deposition, the assessment standards are habitat, and hence designated site, specific.

Table 5-6: Air Quality Assessment Levels for Ecological Receptors

Designation	Name	NO_X – Annual Mean (µg/m^3)	NO_X Daily Mean (µg/m^3)	SO_2 Annual Mean (µg/m^3)	NH_3 Annual Mean (µg/m^3)	N-Deposition Annual Mean (kgN/ha/yr)	Acid Deposition (ClmaxN) Annual Mean (keq/ha/yr)
SAC, SSSI	Epping Forest	30	75	10	1	5	1.73
SSSI	Grays Thurrock Chalk Pits	30	75	20	3	-	-
SSSI	Ingrebourne Marshes	30	75	10	1	15	-
SSSI	Inner Thames Marshes	30	75	20	3	10	-
SSSI	Oxleas Woodlands	30	75	10	1	15	2.72
SSSI	West Thurrock Lagoon and Marshes	30	75	-	3	10	-
LNR	Crossness	30	75	10	1	10	-
LNR	Lesnes Abbey Woods	30	75	10	1	10	-
LNR	Rainham Marshes	30	75	20	3	10	-

Notes:

- Data taken from APIS website[41] for sites other than LNR.
- Provided by professional experts for LNR.

5.5. STUDY AREA

5.5.1. For the assessment of impacts during construction, the Study Area (the Construction Phase Study Area) is limited to the zone within approximately 350m of the Site Boundary or within approximately 50m of routes used by construction vehicles up to 500m from the Site Boundary. This conforms to the IAQM dust guidance[23] and the associated LPG[24]. It is also conservative; in that it assumes that construction works could occur anywhere within the Site Boundary and captures all potential vehicle routes within approximately 500m of the Site Boundary (not just the Site entrance). A plan of the Construction Phase Study Area is provided in **Figure 5-2: Construction Phase Study Area (Volume 2)**.

5.5.2. The operation phase Study Area for air quality extends approximately 15km in all directions from the Carbon Capture Facility within the Site Boundary (referred to in this chapter as the Operational Study Area). The extent of the Operational Study Area aligns with Environment Agency guidance[25] for larger emitters (i.e., over 50MW output) and is depicted in **Figure 5-3: Operational Study Area (Volume 2)**.

5.6. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

Local Authority Monitoring

5.6.1. The Proposed Scheme is located within the local authority area of the London Borough of Bexley, adjacent to the borders of the London Borough of Barking and Dagenham, the London Borough of Havering, Dartford Borough Council and the Royal Borough of Greenwich.

5.6.2. In accordance with their duties under the LLAQM.TG(19)[20] and as required under Part IV of the Environmental Act 2021[11], LBB, LBBD, LBH, DBC and RBG undertake air quality monitoring within their respective jurisdictions.

5.6.3. The baseline monitoring datasets in this section have been sourced from the previous five years of data up to and including 2019 monitoring reported in the 2021 and 2022 Annual Status Reports (ASR). Monitoring completed in 2019 provides the last complete dataset without the influence of social restrictions caused by the Covid-19 pandemic. The inclusion of the 2020 and 2021 data would necessarily skew any trends towards air quality improvements due to reduced levels of public movement and by extension reduced vehicles on the roads and permitted installation activities. As a result, 2020 and 2021 data are discussed but not presented.

5.6.4. LBB, LBBD, LBH and RBG have declared Air Quality Focus Areas (AQFA), which are defined by the Greater London Authority as areas where annual mean NO_2 concentrations exceeded the EU limit (the same standards as the air quality objective for annual mean NO_2 in locations where there is high human exposure). The purpose of the AQFA is to enable targeted measures to reduce NO_2 concentrations. London boroughs are required to have regard to AQFA when developing an Air Quality Action Plan to address any AQMA declaration.

London Borough of Bexley

5.6.5. LAQM information has been taken from the 2021 Air Quality ASR[36].

5.6.6. LBB is covered by a borough-wide AQMA, declared in 2007 for exceedances of 24-hour mean PM_{10} and annual mean NO_2.

5.6.7. The borough has declared two AQFA:

- A206 from Erith Queens Road Roundabout to Northend Roundabout, located approximately 2.6km southeast of the Proposed Scheme; and
- A2 East Rochester Way/Falconwood, located approximately 6km southwest of the Proposed Scheme.

5.6.8. The 2021 ASR indicates that prior to the Covid-19 lockdowns, air quality in the borough was exhibiting a trend for improvement.

5.6.9. Monitoring is undertaken through the use of automatic monitors at four sites. All sites recorded an annual mean concentration of NO_2 under the objective value of 40µg/m³ in 2019. In 2021, none of the automatic monitors operated by LBB recorded concentrations of NO_2 exceeding the objective.

5.6.10. Monitoring locations within 5km of the Proposed Scheme are shown in **Table 5-7: London Borough of Bexley NO2 Automatic Monitoring** with results from the 2021 ASR[36].

Table 5-7: London Borough of Bexley NO_2 Automatic Monitoring[36]

Location ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Approximate Distance from the Site Boundary (km)	NO_2 Concentration (µg/m³)* (Year)				
				2015	2016	2017	2018	2019
BX2	549999	179090	0.8	24	28	28	28	28
BQ7	548465	179469	0.9	22	24	21	21	21
BX1	551864	176379	4.2	26	25	25	23	22

London Borough of Barking and Dagenham

5.6.11. LBBD is covered by a borough-wide AQMA, declared in 2008 for exceedances of 24-hour mean and annual mean NO_2 and 24-hour mean PM_{10}.

5.6.12. The borough has declared three AQFA:

- A13 Ripple Road, located approximately 2.6km northwest of the Proposed Scheme;
- Barking Town Centre, located approximately 4.9km northwest of the Proposed Scheme; and
- Whakebone Lane North, located approximately 2.0km northeast of the Proposed Scheme.

5.6.13. LBBD currently undertakes monitoring at two continuous, automatic sites and at 30 sites for passive diffusion tubes. None of the LBBD monitoring locations were operational in 2019 or in the four years prior.

5.6.14. In 2021, LBBD monitored one exceedance of NO_2 above the objective value of 40 µg/m³ (Dagenham Heathway, approximately 3.7km from the Site Boundary).

London Borough of Havering

5.6.15. LBH is covered by a borough-wide AQMA, declared in 2006 for exceedances of 24-hour mean PM_{10} and annual mean NO_2.

5.6.16. The borough has declared two AQFA:

- Rainham Broadway, located approximately 2.0km northeast of the Proposed Scheme; and
- Romford Town Centre, located approximately 6.7km north of the Proposed Scheme.

5.6.17. The 2021 ASR for LBH states that air quality in the borough has been steadily improving in recent years, and prior to the Covid-19 lockdowns air quality was exhibiting a trend for improvement.

5.6.18. Air quality in LBH is monitored by two continuous automatic sites and 46 passive diffusion tube locations. Monitoring locations within approximately 5km of the Proposed Scheme are shown in **Table 5-8** with results from the 2021 ASR[43].

5.6.19. In 2019, there were eight exceedances of the annual mean concentration of NO_2 above the objective value of 40 µg/m³, the closest of which was at Rush Green Road (approximately 6.5km from the Site Boundary).

5.6.20. In 2021, there were five exceedances of objective value, the closest of which was at Rush Green Road.

Table 5-8: London Borough of Havering NO_2 Automatic Monitoring[40]

Location ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Approximate Distance from the Site Boundary (km)	NO_2 Concentration (µg/m³) Year				
				2015	2016	2017	2018	2019
HAV50	551526	182672	2	**41.1**	**42.2**	**46.1**	39.8	36.6
HAV49	550722	183294	2.2	26.8	27.9	28	34.3	26.6
HAV46	552441	182337	2.4	31.3	34.5	33	32.2	30
HAV3	551726	183462	2.9	28.3	29	31.7	26.5	26
HV1	553127	182506	3.1	32	34	34.3	30	29.1
HAV61	553719	180987	3.3	-	-	-	27.5	26.2
Concentrations that exceed the objective of 40µg/m^3 have been emboldened.								

Dartford Borough Council

5.6.21. DBC has three AQMA, as detailed below and in **Figure 5-1: Air Quality Baseline (Volume 2)**:

- Dartford AQMA No. 1 was declared in 2001 for exceedances of the PM_{10} daily mean and the NO_2 annual mean. AQMA No. 1 extends along the A282 Dartford Tunnel Approach Road in a 250m wide corridor;
- Dartford AQMA No. 2 was declared in 2006 for exceedances of the NO_2 annual mean and encompasses London Road; and
- Dartford AQMA No. 3 was declared in 2006 for exceedances of the NO_2 annual mean. AQMA No. 3 encompasses Dartford Town and approach roads.

5.6.22. Air quality monitoring in DBC is carried out by three automatic monitors and 52 passive diffusion tube locations. There are no monitoring locations within 5km of the Site Boundary.

5.6.23. In 2019 there were eight exceedances of the annual mean concentration of NO_2 above the objective value of 40µg/m^3. The monitor closest to the Proposed Scheme which recorded an exceedance of the objective in 2019 was at Marsh Street (approximately 6.9km from the Site Boundary).

5.6.24. In 2021, there were two exceedances of the objective, the closest of which was at Overy Liberty (approximately 7.7km from the Site Boundary).

Royal Borough of Greenwich

5.6.25. The RBG is covered by a borough-wide AQMA, declared in 2001 for exceedances of 24-hour mean PM_{10} and annual mean NO_2.

5.6.26. The borough has declared seven AQFA, as detailed below:

- Woolwich and Woolwich Arsenal A205 Woolwich Rd/A206 Plumstead Rd;
- Blackwall Tunnel at Southern Approach Road and Westcombe Park;
- Sun-in-the-Sands junction A102/A2 Shooters Hill and Charlton Rd Roundabout;
- Greenwich Centre;
- Greenwich Trafalgar Road A206;
- Eltham High Street; and
- Westhorne Avenue A205.

5.6.27. Air quality monitoring in RBG is carried out by ten automatic monitors and 42 passive diffusion tube locations. Monitoring locations within approximately 5km of the Proposed Scheme are shown in **Table 5-9** with results from the 2021 ASR.

5.6.28. In 2019, there were 17 exceedances of the annual mean concentration of NO_2 above the objective value of 40µg/m³, the closest of which was at GW101 on Plumstead Road (approximately 4.7km from the Site Boundary).

5.6.29. In 2021, there were six exceedances of objective value, the closest of which was at GW101.

Table 5-9: Royal Borough of Greenwich NO_2 Automatic Monitoring[39]

Location ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Approximate Distance from the Site Boundary (km)	NO_2 Concentration (µg/m³) Year				
				2015	2016	2017	2018	2019
GW37	546630	178543	2.7	21.8	22.9	23.3	21	21.9
GN3	545560	178526	3.9	34	36.0	34.0	33.0	34.0
GW34	545490	178543	4.0	38.9	39.1	37.2	33.9	35.3
GW101	544727	178884	4.7	**68.1**	**50.0**	**58.1**	**56.5**	**53.8**
Concentrations that exceed the objective of 40µg/m³ have been emboldened.								

Background Pollutant Concentrations

5.6.30. Background pollutant concentrations are available from the national maps provided on the Defra website[35] where background concentrations of those pollutants included within the Air Quality Strategy have been mapped at a grid resolution of 1x1km for the whole of the UK. Projected concentrations are available for all years between 2018 and 2030.

5.6.31. The background concentrations for NO_x, NO_2, PM_{10} and other pollutants of relevance to the Proposed Scheme are summarised in **Table 5-10** for the current year (2023). The background pollutants in **Table 5-10** account for the contribution of existing industrial processes in the vicinity of the Proposed Scheme.

5.6.32. Where available, background concentrations for pollutants are within the standards for the protection of human health for all pollutants, although background concentrations of NO_2 in particular are elevated at the roadside.

Table 5-10: Defra Background Annual Mean Pollutant Concentrations Based on 30km x 30km Operational Phase Study Area for 2023 Baseline

Statistic	2023 Annual Mean Background (µg/m^3)						
	NO_x	NO_2	SO_2	PM_{10}	$PM_{2.5}$	HCl	NH_3
Minimum	12.9	9.8	2.7	13.4	8.9	No data	1.2
Maximum	**63.6**	36.5	4.1	20.3	14.0	No data	2.3
Average	23.8	16.7		16.2	10.7	No data	1.6
Air Quality Standard/ EAL	30*	40	10 – 20*	40	20	16	180
* For vegetation. Note: Concentrations that exceed the relevant AQS have been emboldened.							

5.6.33. Background annual mean concentrations of NO_x, SO_2 and NH_3 at ecological receptors, in addition to annual mean acid and nitrogen (N) deposition rates, were taken from the APIS website[41]. The data is based on a three-year mean (2019-2021), which represents the latest available data at the time of writing. A summary of the background concentrations and deposition levels at the identified ecological receptors is presented in **Table 5-11**.

5.6.34. NOx concentrations are elevated where road traffic impacts are significant, including over Epping Forest SAC/SSI where the critical level is exceeded in places. SO_2 concentrations are very low everywhere and are at no risk of exceeding the Site specific critical level (as such, no spatial variation is included). For sites where the critical level for ammonia is 3µg/m^3, background ammonia concentrations do not exceed the critical level. However, for sites where the critical level is 1µg/m^3, including Epping Forest SAC/SSSI, the critical level is exceeded across the entire site. Background nitrogen deposition exceeds the critical load for all sites and habitats.

Table 5-11: Background Annual Mean Range of Pollutant Concentrations and Deposition Levels at Ecological Sites

Designation	Habitat Site	NO_X - annual mean (µg/m^3)	SO_2 Annual Mean (µg/m^3)	NH_3 Annual Mean (µg/m^3)	N-Deposition Annual Mean (kgN/ha/yr)
SAC, SSSI	Epping Forest	19.3 - **35.7**	4.1 (maximum in Study Area)	**1.55 - 2.05**	**30**
SSSI	Grays Thurrock Chalk Pits	25.7 - 27.9		1.42 - 1.43	**30**
SSSI	Ingrebourne Marshes	18.5 - 24.0		**1.42 - 1.5**	**14.03 - 14.33**
SSSI	Inner Thames Marshes	20.5 - 28.3		1.43	**14.37**
SSSI	Oxleas Woodlands	22.3 - 25.6		**1.69 - 1.75**	**30**
SSSI	West Thurrock Lagoon and Marshes	29.9 - **55.0**		0 - 1.41	**13.55**
LNR	Crossness	23.3 - 23.3		**1.52 - 1.52**	**14.67**
LNR	Lesnes Abbey Woods	21.9 - 22.9		**1.59 - 1.64**	**30**
LNR	Rainham Marshes	21.2 - 28.3		0 - 1.43	14.37
Note: Values shown in bold exceed the Site specific critical load/level.					

Proposed Scheme Specific Air Quality Monitoring

5.6.35. Monitoring of NO_2 was carried out in the vicinity of Riverside 1 and Riverside 2for three months between April 2023 and June 2023 using passive diffusion tubes installed at 15 monitoring locations, shown on **Figure 5-1: Air Quality Baseline (Volume 2)**.

5.6.36. The annualised results of the NO_2 passive monitoring are presented in **Table 5-12**. The data obtained indicates that NO_2 concentrations are all below the Air Quality Strategy objective (40µg/m^3) at all sites except Location 5. Location 5 (located 0.1km from the Site Boundary) was installed adjacent to the A2016 opposite Travelodge Belvedere, which is an extremely busy roadway. Additionally, Site 2 (which shows the next highest concentration, located within the Site Boundary) was installed on Norman Road, primarily used by heavy duty vehicles travelling to Riverside 1 and adjacent industrial properties.

Table 5-12: Site Specific NO_2 Passive Monitoring

Location ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Approximate Distance from the Site Boundary (km)	Annualised 2022 NO_2 Concentration (µg/m^3)
1	549567	179974	Within Site Boundary	26.5
2	549647	180289		30.1
3	549684	180542		25.1
4	549789	179864		20.2
5	549810	179531	0.1	**42.0**
6	549338	179437	0.4	25.8
7	549585	180758	0.4	27.7
8	547919	179656	1.4	21.2
9	547773	178597	2.0	27.9
10	554839	178716	4.9	19.4
11	552038	180763	1.6	15.2
12	551330	180659	0.9	15.4
13	552696	183133	3.1	11.2
14	550200	183353	2.2	14.1
15	553496	184861	5.0	14.1
Concentrations that exceed the objective of 40µg/m^3 have been emboldened.				

FUTURE BASELINE

5.6.37. Pollutant concentrations are anticipated to decrease in the future, most noticeably at the roadside, but also at background sites. This is due to the replacement of older, more polluting vehicles with newer, cleaner vehicles as emissions technologies improve and with the introduction of electric vehicles into the fleet. The decreasing trend is expected to be strongest for NO_2 concentrations (for which road transport is the most significant local emissions source) and weakest for particulate matter.

5.6.38. New processes within the Study Areas, including the operation of Riverside 2, may result in a slowing of the rate of improvement in localised areas. However, these are unlikely to completely offset the impacts of reduced vehicle emissions. The operation of Riverside 2 is included within the assessment presented in this chapter.

5.6.39. SO_2 concentrations are expected to remain low throughout the lifetime of the Proposed Scheme, although the short term trend in NH_3 is uncertain. It is possible that there might be a minor increase in the short term before national policies to reduce ammonia emissions result in declining trends.

5.6.40. Nitrogen deposition is anticipated to decline in the future, driven by the decrease in emissions of nitrogen oxides. This rate of decline may be offset to a degree by increasing NH_3 emissions in the short term, but this is not expected to reverse the overall declining trend.

5.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

5.7.1. This section sets out the embedded design, mitigation and enhancement measures relevant to the air quality assessment.

CONSTRUCTION PHASE

5.7.2. Mitigation measures for construction dust impacts will be included within the OCoCP for the Proposed Scheme. The following measures taken from IAQM dust guidance[23] and generally apply to construction sites:

Communications

- Display the name and contact details of person(s) accountable for air quality and dust issues on the site. This may be the environment manager/engineer or the Site Manager.
- Display the head or regional office contact information.

Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the logbook.

Monitoring

- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues onsite when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the Site Boundary that are at least as high as any stockpiles onsite.

Operating Vehicle/Machinery and Sustainable Travel

- Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable.
- Ensure all vehicles switch off engines when stationary – no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.

Waste Management

- No bonfires and burning of waste materials on the Site.

OPERATION PHASE

5.7.3. For the Carbon Capture Facility measures include:

- Recommended minimum height of 100m for the Absorber Stack, see **Appendix 5-2: Operation Phase Assessment (Volume 3)**).
- Setting maximum diameters for the Absorber Stacks:
  - Maximum of 3.1m for Absorber Stack associated with Riverside 1; and
  - Maximum of 2.5m for Absorber Stack associated with Riverside 2.
- Flue gas from the two new Absorber Stacks to be continuously monitored via a Continuous Emissions Monitoring System (CEMS).

5.7.4. Pollutant concentration limits for pollutants introduced by the carbon capture process will be set in the environmental permit for the Carbon Capture Facility. It is anticipated that the emissions limits will be as per those set in Table 2A in **Appendix 5-2: Operation Phase Assessment (Volume 3)**); because these pollutants will be used as the basis for the environmental permit limits.

5.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

5.8.1. This section details the preliminary assessment of impacts and effects for the Proposed Scheme during both the construction and operation phases considering the embedded design, mitigation and enhancement measures detailed in **Section 5.7**.

5.8.2. The choice between demolition or retention of the Belvedere Power Station Jetty (disused) will not change the outcomes of the preliminary assessment of impacts and effects reported within this technical chapter, which assume its removal. Should the disused jetty be retained, instead of demolished as the assessment below assumes, the quantity of construction activities and associated vehicle movements would reduce, therefore reducing the extent of the adverse air quality effects reported in this technical chapter, although this will be assessed and confirmed in the ES.

CONSTRUCTION PHASE

Impacts from Dust, PM_{10} and $PM_{2.5}$

5.8.3. The likely potential significant effects for air quality associated with the construction phase are set out below.

5.8.4. A preliminary qualitative dust assessment has been completed with reference to the relevant IAQM dust guidance[23] to determine the potential for dust impacts at human receptors within the Construction Phase Study Area. **Appendix 5-1: Construction Dust Assessment (Volume 3)** provides details of the construction dust assessment approach and associated findings. A summary of the findings is presented below.

5.8.5. Construction activities that have the potential to generate and/or re-suspend dust, PM_{10} and $PM_{2.5}$ include:

- site clearance and preparation;
- preparation of temporary access/egress to the Site and haulage routes;
- earthworks;
- materials handling, storage, stockpiling, spillage and disposal;
- movement of vehicles and construction traffic within the Site;
- construction of buildings, roads and areas of hardstanding alongside fabrication processes;
- internal and external finishing refurbishment; and
- site landscaping.

5.8.6. Most releases are likely to occur during the working week. However, for some potential release sources (e.g., exposed soil produced from significant earthworks activities) in the absence of dust control mitigation measures, dust generation has the potential to occur 24 hours per day over the period during which such activities are to take place.

5.8.7. Based on a review of the Construction Phase Study Area, there are human receptors located within approximately 350m of the Site Boundary and/or within approximately 50m of the likely routes to be used by construction vehicles, up to approximately 500m from the Site entrance. As such, the risk of dust impacts from the construction phase cannot be screened out.

5.8.8. The next stage of the assessment requires the potential dust emission magnitude to be determined for dust and PM_{10} sources: demolition, earthworks, construction, and trackout. Overall, the dust emission magnitude from each of these activities is classed as ‘large’, based on the following:

- Demolition:
  - Demolition of the Munster Joinery and the Belvedere Power Station Jetty (disused) with a total building volume of less than 20,000m^3 and demolition of potentially dusty construction material (concrete).
- Earthworks:
  - The total area within the Site encompasses more than 10,000m^2 and the soil type is potentially dusty clay material. It is assumed that there will be more than 10 earth-moving vehicles onsite during peak earthwork activities, and is it assumed that more than 100,000 tonnes of material will be moved in total.
- Construction:
  - It is assumed that the total volume of all buildings to be constructed will exceed 100,000m^3.

- Trackout:
  - It is assumed that there will be in excess of 50 HDV movements per day during peak construction activity, along with what is assumed to be more than 100m of unpaved roads used within the Site.

Table 5-13: Summary Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	Large
Earthworks	Large
Construction	Large
Trackout	Large

5.8.9. The next stage of the assessment requires the sensitivity of the area to dust soiling and human health effects, which are based on identifying the number of properties and human receptors located within discrete distance bands from the Site Boundary. As shown in **Figure 5-2: Construction Phase Study Area (Volume 2)** the distance bands are set at:

- 20m, 50m, 100m, 200m and 350m from the Site Boundary for human receptors;
- 50m of routes used by construction vehicles up to 500m from the Site Boundary; and
- 20m and 50m from the Site Boundary for ecological receptors.

5.8.10. Wind roses from the meteorological data used for the dispersion modelling of operation phase impacts are provided in **Appendix 5-2: Operation Phase Assessment (Volume 3)**. The wind roses show that the prevailing wind direction is from the southwest. Therefore, receptors located to the northeast of the Site Boundary are more likely to be affected by dust and particulate matter emitted and re-suspended during the construction phase.

5.8.11. Under low wind speed conditions, it is likely that the majority of dust would be deposited in the area immediately surrounding the source. By conservatively assuming that any construction activities could occur anywhere within the Site Boundary, sensitive receptors within approximately 100m of the Site Boundary would include Iron Mountain Records Storage Facility, Lidl Warehouse/Belvedere Regional Distribution Centre, Asda Belvedere Distribution Centre, Snap Fitness Belvedere and Travelodge London Belvedere. Within approximately 350m from the Site Boundary are residential receptors along Norman Road, North Road and Poppy Close.

5.8.12. The closest properties to trackout routes are approximately 170m from the A2016, along Poppy Close, North Road and Norman Road.

5.8.13. The Crossness LNR sits within the Site Boundary, but as its status is of local designation it is considered to have low sensitivity to impacts from construction dust as per IAQM dust guidance[23]. There are no other ecological sites within 50m of the Site Boundary.

5.8.14. Taking account of the above, and that the background annual mean PM_{10} concentration is 17.9µg/m^3 within the Construction Phase Study Area, the IAQM dust guidance[23] criteria have been used to determine that the sensitivity of the area is medium for dust soiling effects and low for human health and ecological (PM_{10}) impacts for all relevant construction activities.

Table 5-14: Outcome of Defining the Sensitivity of the Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	Medium	Medium	Medium	Medium
Human health	Low	Low	Low	Low
Ecological	Low	Low	Low	Low

5.8.15. By combining the dust emission magnitude with the sensitivity of the area, the risk of construction dust effects without mitigation applied is shown in **Table 5-15** below. Given that the overall dust risk is High Risk, there is some potential for temporary, moderate adverse effects. These effects are most likely to occur when earthworks and construction activities are being undertaken in the southern and eastern areas of the Site, where the Site Boundary is closer to receptor points.

Table 5-15: Summary Dust Risk Table to Define Site-Specific Mitigation

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	High Risk	Medium Risk	Medium Risk	Medium Risk
Human health	Medium Risk	Low Risk	Low Risk	Low Risk
Ecological	Medium Risk	Low Risk	Low Risk	Low Risk

5.8.16. The assessed risk rating has been used to determine the appropriate prevention and mitigation measures additional to those discussed in section **5.7**, as given by IAQM dust guidance[23], that should be applied via the implementation of a CoCP, an Outline of which will be submitted with the application for development consent. These measures are presented in **Section 5.9**.

5.8.17. For the assessment of effects on dust soiling the sensitivity of the area is medium. The magnitude of change is low. Therefore, there is likely to be a direct, temporary, short term, **minor to moderate adverse** (**not significant**) effect on nearby places of work.

5.8.18. For the assessment of effects on human health the sensitivity of the area is low. The magnitude of change is low. Therefore, there is likely to be a direct, temporary, short term, **minor adverse** (**not significant**) effect on nearby places of work.

5.8.19. For the assessment of effects on ecological sites the sensitivity of the area is low. The magnitude of change is low. Therefore, there is likely to be a direct, temporary, short term, **minor adverse** (**not significant**) effect on Crossness LNR.

Emissions of NO_2, PM_{10} and $PM_{2.5}$ from operational NRMM

5.8.20. The greatest impact on air quality due to emissions from vehicles and plant associated with the construction phase will be in the areas immediately adjacent to the site access. It is anticipated that construction traffic will access the Site via Norman Road. Most of the immediate surrounding area is related to industry, therefore (as per IAQM/EPUK guidance[22]), not considered to be a long-term receptor. The sensitivity of the surrounding area for human health is low.

5.8.21. Final details of the exact plant and equipment likely to be used onsite will be determined by the appointed contractor; it is considered likely to comprise dump trucks, tracked excavators, diesel generators, asphalt spreaders, rollers, compressors and trucks. The number of plant and their location within the Site are likely to be variable over the construction period. An offset distance between any potential humans and any NRMM is being pursued in site design and not all of the plant will operate at the same time in the same location, therefore the magnitude of change is likely to be low.

5.8.22. For the assessment of effects on human health the sensitivity is low. The magnitude of change is also low. Therefore, there is likely to be a direct, temporary, short term, **negligible effect** on human health (**not significant**).

Road Traffic Emissions of NO_2, PM_{10} and $PM_{2.5}$

5.8.23. This assessment will be presented in Chapter 5: Air Quality (Volume 1) of the ES once further construction information is available.

Marine Vessel Emissions of NO_2, PM_{10} and $PM_{2.5}$

5.8.24. This assessment will be presented in Chapter 5: Air Quality (Volume 1) of the ES once further construction information is available.

OPERATION PHASE

Changes To Emissions of Pollutants arising from the Riverside Campus as a result of the Carbon Capture Facility

5.8.25. The likely potential significant effects for air quality associated with the operation phase of the Proposed Scheme are summarised below.

5.8.26. The following show the spatial distribution of modelled impacts that do not screen as negligible against the project criteria set out in **Table 5-4**:

- **Figure 5-4: NO_2 Annual Baseline PC (Volume 2)**
- **Figure 5-5: NO_2 Annual Carbon Capture PC (Volume 2)**
- **Figure 5-6: NO_2 Annual Impact (Volume 2)**
- **Figure 5-7: NO_2 1 Hour Impact (Volume 2)**
- **Figure 5-8: SO_2 15 Minute Impact (Volume 2)**
- **Figure 5-9: SO_2 1 Hour Impact (Volume 2)**
- **Figure 5-10: SO_2 24 Hour Impact (Volume 2)**
- **Figure 5-11: Nitrosamine-2 Annual Impact (Volume 2)**
- **Figure 5-12: Nitramine-2 Annual Impact (Volume 2)**
- **Figure 5-13: Aldehyde Annual Impact (Volume 2)**

5.8.27. A detailed explanation of the spatial distribution of impacts is provided in **Appendix 5-2: Operation Phase Assessment (Volume 3)**, and further model results are provided in **Appendix 5-3: Detailed Model Pollutant Results (Volume 3)**.

5.8.28. For pollutants currently emitted by Riverside 1 and Riverside 2 (including AQS pollutants), the maximum ground level concentrations and Proposed Scheme impacts, anywhere within the receptor grid for any of the five years' worth of meteorological data modelled, are shown for non-metal pollutants in **Table 5-16** and for heavy metals in **Table 5-17**.

5.8.29. Pollutants for which the maximum adverse impact cannot be screened out as being negligible, i.e., with an impact >1% of the long-term standard or >10% of the short-term standard, are shown in bold. Furthermore, where the predicted maximum adverse impact on ground level receptors cannot be screened out as negligible, the background concentration and PECs have been reported.

5.8.30. The point of maximum impact occurs around 600m to the east-northeast of the Carbon Capture Facility, within the River Thames, where the background NO_2 concentration is relatively low (<20µg/m^3). As a result, the total PEC is within the air quality standard. The maximum beneficial impact is also 1.6µg/m^3, which occurs around 600m northeast of the Carbon Capture Facility.

5.8.31. Maximum adverse impacts where there are residential properties are less than 0.4µg/m^3 (in Rainham). Furthermore, impacts have been modelled at full load operation and with emissions at the permitted limits. This is a conservative assumption since, for NO_x (70% of which is predicted to be converted to NO_2 as an annual mean), between 2020 and 2022, at no time did the actual emissions exceed the permitted daily average limit for Riverside 1[48,49,50].

5.8.32. The maximum modelled hourly mean NO_2 PC at ground level with the operation of the Proposed Scheme is 55.9µg/m3 over the modelled scenarios and the maximum PEC with the Proposed Scheme is 92.1µg/m3 which is well within the air quality standard. The maximum adverse impact is 31.6µg/m3, which is 15.8% of the objective; the maximum beneficial impact is 23.2µg/m3. Taking into consideration the modelling of full load operation with emissions at the permitted limits, the maximum hourly mean NO_2 PC is conservative since, for NOx (35% of which is predicted to be NO_2), between 2020 and 2022, emissions did not exceed 60% of the 30 minute permitted limit at any time.

5.8.33. Overall, whilst the impact of the Proposed Scheme on NO_2 concentrations cannot be screened as negligible, with total pollutant concentrations (PEC) being well within the standards at the point of maximum impact, no significant effects are likely in relation to changed exposure to NO_2.

5.8.34. For other non-metal and metal pollutants, the impacts for the majority of pollutants are negligible (<1% of the long term standard/<10% of the short term standard).

5.8.35. For those pollutants for which the impacts cannot be screened as negligible (SO_2, arsenic, cadmium and nickel), the predicted maximum ground level concentrations do not exceed the assessment levels and no significant effects are likely.

5.8.36. For 15 minute mean SO_2 and 1 hour mean SO_2, the maximum adverse impacts are >10% of the short-term standard. As discussed with NO_2, the impacts of the Proposed Scheme have been conservatively modelled at maximum permitted operation with emissions at the permitted limits. For SO_2, between 2020 and 2022, emissions did not exceed 20% of the permitted limits at any time and, therefore, 15 minute mean and 1 hour mean SO_2 impacts are likely to be insignificant under normal operations.

5.8.37. The maximum adverse impact of annual mean Arsenic is 3.0% of the long-term standard and therefore cannot be screened out. Similarly, the maximum adverse annual mean Nickel is 4.7% of the long-term standard. However, these are conservative predictions modelled at full load operation of the Proposed Scheme with emissions at the permitted limit. Between 2020 and 2022, the combined release of Arsenic and Nickel did not exceed 10% of the permitted limits at any time.

5.8.38. The maximum adverse impact of annual mean Cadmium is 7.8% of the long-term standard. As with Arsenic and Nickel, the annual mean adverse impact of Cadmium is likely to be insignificant under normal operations of the Proposed Scheme since, between 2020 and 2022, emissions of Cadmium did not exceed 5% of the permitted limits at any time.

5.8.39. $PM_{2.5}$ has been assessed on the assumption that all particulate matter is in the $PM_{2.5}$ size fraction. Further, it has been assessed against the current standard of 20µg/m^3 and found to be negligible. In 2040, the statutory $PM_{2.5}$ target concentration reduces to 10µg/m^3. The maximum impact of the Proposed Scheme is 0.6% of this revised target. Taking into account the conservative assumptions within the assessment i.e. emissions always at maximum permitted operation and all PM being $PM_{2.5}$, no significant effects are likely.

Table 5-16: Maximum Ground Level Concentrations of Non-metal Pollutants Across the Operational Study Area

Pollutant	Averaging time	Baseline Max Mean PC (µg/m^3)	With Proposed Scheme Max Mean PC (µg/m^3)	Max Adverse Impact (µg/m^3)	Max Beneficial Impact (µg/m^3)	Air Quality Standard (µg/m^3)	Max Adverse as % of Standard	Max Beneficial as % of Standard	2023 Background Concentration (µg/m^3)	PEC	PEC as % of Standard
NO_2	1 hour	50.8	55.9	31.6	-23.2	200	**15.8%**	-11.6%	18.09	92.1	46.1%
	Annual	3.2	3.6	1.6	-1.6	40	**4.1%**	-4.1%	18.1	21.7	54.2%
PM_{10}	Daily	0.7	0.6	0.2	-0.6	50	0.4%	-1.1%	-	-	-
	Annual	0.2	0.2	0.1	-0.2	40	0.1%	-0.4%	-	-	-
$PM_{2.5}$	Annual	0.2	0.2	0.1	-0.2	20	0.3%	-0.9%	-	-	-
SO_2	15 minutes	103.7	122.4	66.8	-56.7	266	**25.1%**	-21.3%	2.4	127.2	47.8%
	1 hour	71.3	75.9	39.7	-30.0	350	**11.4%**	-8.6%	2.4	80.7	23.1%
	Daily	6.9	7.1	3.5	-4.7	125	2.8%	-3.8%	-	-	-
CO	8 hours	54.0	53.8	25.9	-27.9	10000	0.3%	-0.3%	-	-	-
HF	1 hour	0.4	0.7	0.5	-0.3	160	0.3%	-0.2%	-	-	-
HCl	1 hour	26.6	42.0	31.7	-18.0	750	4.2%	-2.4%	-	-	-
	Annual	0.3	0.3	0.1	-0.2	16	0.6%	-1.3%	-	-	-
NH_3	1 hour	6.7	10.5	7.9	-4.5	2500	0.3%	-0.2%	-	-	-
	Annual	0.5	0.5	0.2	-0.3	180	0.1%	-0.2%	-	-	-

Note: PEC only shown where the maximum adverse impact cannot be screened as negligible.

Table 5-17: Maximum Ground Level Concentrations of Metal Pollutants Across the Operational Study Area

Pollutant	Averaging time	Baseline Max Mean PC (µg/m^3)	With Proposed Scheme Max Mean PC (µg/m^3)	Max Adverse Impact (µg/m^3)	Max Beneficial Impact (µg/m^3)	Air Quality Standard (µg/m^3)	Max Adverse as % of Standard	Max Beneficial as % of Standard	2023 Background Concentration (µg/m^3)	PEC	PEC as % of Standard
Arsenic	Annual	0.001	0.001	0.0002	-0.001	0.006	**3.0%**	-8.8%	0.0008	0.00138	23.1%
Cadmium	Annual	0.001	0.001	0.0002	-0.001	0.005	**4.7%**	-14.1%	0.0002	0.00096	19.2%
Lead	Annual	0.001	0.001	0.0004	-0.001	0.25	0.1%	-0.4%	-	-	-
Nickel	Annual	0.006	0.005	0.002	-0.005	0.02	**7.8%**	-23.2%	0.0017	0.00657	32.9%
Antimony	1 hour	0.003	0.005	0.004	-0.002	150	0.002%	-0.001%	-	-	-
	Annual	0.0003	0.0003	0.0001	-0.0002	5	0.002%	-0.005%	-	-	-
Chromium III	1 hour	0.024	0.039	0.029	-0.017	150	0.02%	-0.01%	-	-	-
	Annual	0.003	0.002	0.001	-0.002	5	0.01%	-0.04%	-	-	-
Chromium VI	Annual	0.000004	0.000003	0.000001	-0.000003	0.00025	0.4%	-1.3%	-	-	-
Copper	1 hour	0.008	0.012	0.009	-0.005	200	0.005%	0.00%	-	-	-
	Annual	0.001	0.001	0.0002	-0.001	10	0.002%	-0.01%	-	-	-
Manganese	1 hour	0.016	0.025	0.019	-0.011	1500	0.001%	0.00%	-	-	-
	Annual	0.002	0.001	0.0004	-0.001	0.15	0.3%	-0.8%	-	-	-
Mercury	1 hour	0.009	0.014	0.011	-0.006	7.5	0.1%	-0.1%	-	-	-
	Annual	0.001	0.001	0.0002	-0.001	0.25	0.1%	-0.3%	-	-	-
Vanadium	Daily	0.255	0.278	0.030	0.000	1	3.0%	0.0%	-	-	-
Note: PEC only shown where the maximum adverse impact cannot be screened as negligible.											

5.8.40. **Table 5-18** shows the maximum ground level concentrations across the Operational Study Area for the compounds introduced by the Proposed Scheme as a result of the carbon capture process.

5.8.41. The maximum annual mean PC with the Proposed Scheme for Nitrosamine 2, Nitramine 2 and Aldehyde are >1% of the long-term standard and therefore cannot be classed as insignificant.

5.8.42. For nitramines, assessing the impacts against NDMA is conservative, since nitramines are, in general, lower risk than nitrosamines (see **Appendix 5-2: Operation Phase Assessment (Volume 3)**) and effects are likely to be insignificant.

5.8.43. The maximum impacts occur approximately 600m to the northeast of the Carbon Capture Facility, in the Thames. There is no realistic long term exposure to these pollutants within 800m of the two new Absorber Stacks and, at residential properties, the maximum nitrosamine concentration is 0.003µg/m^3 (1.5% of the EAL) (**Figure 5-11: Nitrosamine-2 Annual Impact (Volume 2)**).

5.8.44. Further sensitivity analysis will be undertaken and presented in the ES to further quantify the potential change in exposure to nitrosamine in ambient air.

Table 5-18: Maximum ground level concentrations across the Operational Study Area of New Compounds introduced by the Proposed Scheme

Pollutant	Averaging Time	With Development Maximum Mean PC (µg/m^3)	Air Quality Standard (µg/m^3)	Max Adverse Impact as % of Standard
Amine 1	1 hour	1.3	400	0.3%
	Daily	0.5	100	0.5%
Amine 2	1 hour	1.3	400	0.3%
	Daily	0.4	100	0.4%
Nitrosamine 2	Annual	0.0000094	0.0002	**4.7%**
Nitramine 1	Annual	0.0000018	0.0002	0.9%
Nitramine 2	Annual	0.0000140	0.0002	**7.0%**
Aldehyde	1 hour	7.0	100	7.0%
	Annual	0.2	5	**3.7%**

Potential Effects within Local Authorities

5.8.45. In this section, the contributions of the Proposed Scheme to air pollution within each local authority discussed in the baseline (**Section 5.6**) are presented as maximum ground level concentrations in **Table 5-19**. Concentrations are presented for both the Baseline and Proposed Scheme scenarios. Pollutants for which the maximum adverse impact cannot be screened out as being negligible (with >1% of the long-term standard or >10% of the short-term standard) are shown in bold.

5.8.46. The London Borough of Bexley, in which the Proposed Scheme is located, has the highest adverse impact of all the pollutants detailed in **Table 5-19**.

5.8.47. The 1-hour NO_2 mean exceeds 10% of the objective in LBB, and the annual mean NO_2 exceeds 1% of the objective in the LBB and LBH. Note that these likely maximum concentrations of NO_2 are conservative as the impacts have been modelled at full load operation with emissions at the permitted limits. As stated in **Paragraph5.8.32**, with typical emission concentrations rather than permitted emission limits, it is likely that the NO_2 impact in these local authorities would be negligible. Moreover, even with emissions at the maximum permitted limit, the PEC does not exceed the objective and so no significant effects are likely.

5.8.48. The 15 minute mean SO_2 impact exceeds 10% of the objective in LBB, LBH and RBG. The 1-hour mean SO_2 impact exceeds 10% of the objective in LBB. As with the NO_2 impact, these maximum SO_2 impacts are conservative estimates With emissions at maximum permitted limits there is no realistic risk of the PEC exceeding the objective, and with emissions at typical concentrations impacts from the Proposed Scheme are likely to be negligible in the local authorities.

5.8.49. The annual mean nitrosamine 2 impacts and the annual mean aldehyde impacts exceed 1% of the long-term objective in LBB, LBBD and LBH. The annual mean nitramine 2 impacts exceed 1% of the long-term objective in LBB, LBBD, LBH and RBG. These pollutant impacts cannot be screened as negligible.

5.8.50. However, taking into account the lower risks associated with nitramines, assessment against the EAL for NDMA is conservative and effects are likely to be **Not Significant**. Furthermore, as noted previously in **Paragraph 5.8.43**, where there is significant potential for long term exposure (residential properties, health/education facilities), impacts from nitrosamines will be considerably lower than presented as a maximum in LBB.

Table 5-19: Maximum Ground Level Concentrations Across the Operational Study Area in Relevant Local Authorities

Pollutant	Averaging time	Baseline Max Mean PC (µg/m^3)	With Development Max Mean PC (µg/m^3)	Max Adverse Impact (µg/m^3)	Air Quality Standard (µg/m^3)	Max Adverse Impact as % of Standard
London Borough of Bexley (LBB)						
NO_2	1 hour	50.8	55.9	31.6	200	**15.8%**
	Annual	3.2	3.6	1.6	40	**4.1%**
SO_2	15 minutes	103.7	122.4	66.8	266	**25.1%**
	1 hour	71.3	75.9	39.7	350	**11.4%**
	Daily	6.9	7.1	3.5	125	2.8%
Nitrosamine 2	Annual	No Emissions	0.009	0.009	0.2	**4.7%**
Nitramine 2	Annual		0.014	0.014	0.2	**7.0%**
Aldehyde	Annual		0.184	0.184	5	**3.7%**
London Borough of Havering (LBH)						
NO_2	1 hour	35.5	43.3	10.5	200	5.2%
	Annual	3.2	3.4	0.8	40	**2.0%**
SO_2	15 minutes	68.7	87.2	35.5	266	**13.3%**
	1 hour	50.4	60.8	14.3	350	4.1%
	Daily	6.7	6.8	1.5	125	1.2%
Nitrosamine 2	Annual	No emissions	0.007	0.007	0.2	**3.4%**
Nitramine 2	Annual		0.009	0.009	0.2	**4.5%**

Pollutant	Averaging time	Baseline Max Mean PC (µg/m^3)	With Development Max Mean PC (µg/m^3)	Max Adverse Impact (µg/m^3)	Air Quality Standard (µg/m^3)	Max Adverse Impact as % of Standard
Aldehyde	Annual		0.176	0.176	5	**3.5%**
London Borough of Barking and Dagenham (LBBD)						
NO_2	1 hour	47.3	40.7	4.1	200	2.0%
	Annual	2.1	1.0	0.0	40	0.1%
SO_2	15 minutes	94.4	85.0	14.0	266	5.3%
	1 hour	65.7	56.0	4.7	350	1.3%
	Daily	6.4	4.1	0.4	125	0.3%
Nitrosamine 2	Annual	No emissions	0.007	0.007	0.2	**3.5%**
Nitramine 2	Annual		0.009	0.009	0.2	**4.7%**
Aldehyde	Annual		0.054	0.054	5	1.1%
Royal Borough of Greenwich (RBG)						
NO_2	1 hour	24.0	31.2	12.6	200	6.3%
	Annual	0.5	0.7	0.2	40	0.5%
SO_2	15 minutes	54.9	79.1	30.2	266	**11.3%**
	1 hour	32.6	41.7	16.2	350	4.6%
	Daily	1.7	2.1	0.6	125	0.5%
Nitrosamine 2	Annual	No emissions	0.0004	0.0004	0.2	0.2%
Nitramine 2	Annual		0.003	0.003	0.2	**1.5%**

Pollutant	Averaging time	Baseline Max Mean PC (µg/m^3)	With Development Max Mean PC (µg/m^3)	Max Adverse Impact (µg/m^3)	Air Quality Standard (µg/m^3)	Max Adverse Impact as % of Standard
Aldehyde	Annual		0.036	0.036	5	0.7%
London Borough of Dartford (LBD)						
NO_2	1 hour	12.7	11.5	2.5	200	1.3%
	Annual	0.3	0.3	0.0	40	0.1%
SO_2	15 minutes	28.0	33.5	8.2	266	3.1%
	1 hour	16.4	14.5	3.5	350	1.0%
	Daily	1.0	1.0	0.2	125	0.1%
Nitrosamine 2	Annual	No emissions	0.0001	0.0001	0.2	0.0%
Nitramine 2	Annual		0.001	0.001	0.2	0.5%
Aldehyde	Annual		0.014	0.014	5	0.3%

Potential Effects within Air Quality Focus Areas

5.8.51. In this section, the contribution of the Proposed Scheme to air pollution within Air Quality Focus Areas within 5km of the Site Boundary are presented as maximum ground level concentrations in **Table 5-19**. Concentrations are presented for both the Baseline and Proposed Scheme scenarios. Pollutants for which the maximum adverse impact cannot be screened out as being negligible (with >1% of the long-term standard or >10% of the short-term standard) are shown in bold.

5.8.52. The impact of the Proposed Scheme on annual mean NO_2 is <1.0% of the objective in all AQFA (<10% of the hourly mean). Therefore, at the roadside, where there is potential exposure of the public and elevated concentrations due to traffic emissions, the impact of the Proposed Scheme is likely to be negligible.

5.8.53. The SO_2 impacts within the AQFA can also be screened out as negligible.

5.8.54. The annual mean nitrosamine 2 impacts exceed 1% of the long-term objective in the A13 Ripple Road AQFA and the Rainham Broadway AQFA. The annual mean aldehyde impacts exceed 1% of the long-term objective in the Rainham Broadway AQFA but are <2% of the EAL for NDMA. Whilst the pollutant impacts cannot be screened as negligible, increased risk to health is very low when considering the overall conservative nature of the assessment.

Table 5-20: Maximum Ground Level Concentrations Across Receptor Points in Air Quality Focus Areas within 5km of the Site Boundary

Pollutant	Averaging Time	Baseline Max Mean PC (µg/m^3)	With Proposed Scheme Max Mean PC (µg/m^3)	Max Adverse Impact (µg/m^3)	Max Beneficial Impact (µg/m^3)	Max Adverse as % of Objective
London Borough of Bexley - A206 AQFA						
NO_2	1 hour	12.0	12.6	2.5	200	1.3%
	Annual	0.1	0.2	0.0	40	0.1%
SO_2	15 minutes	28.7	40.3	13.0	266	4.9%
	1 hour	15.2	17.3	3.3	350	0.9%
	Daily	0.8	0.9	0.2	125	0.2%
Nitrosamine 2	Annual	0.0002	0.0002	0.0002	0.2	0.08%
Nitramine 2	Annual	0.002	0.002	0.002	0.2	0.9%
Aldehyde	Annual	0.009	0.009	0.009	5	0.2%
London Borough of Havering – Rainham Broadway AQFA						
NO_2	1 hour	16.9	22.7	8.3	200	4.2%
	Annual	1.0	1.2	0.2	40	0.6%
SO_2	15 minutes	42.7	55.7	16.3	266	6.1%
	1 hour	21.8	29.5	10.2	350	2.9%
	Daily	1.9	2.2	0.4	125	0.4%
Nitrosamine 2	Annual	0.001	0.001	0.0006	0.2	0.3%

Pollutant	Averaging Time	Baseline Max Mean PC (µg/m^3)	With Proposed Scheme Max Mean PC (µg/m^3)	Max Adverse Impact (µg/m^3)	Max Beneficial Impact (µg/m^3)	Max Adverse as % of Objective
Nitramine 2	Annual	0.003	0.003	0.003	0.2	**1.6%**
Aldehyde	Annual	0.06	0.06	0.063	5	**1.3%**
London Borough of Barking and Dagenham – A13 Ripple Road AQFA						
NO_2	1 hour	12.9	12.2	1.7	200	0.9%
	Annual	0.1	0.2	0.0	40	0.0%
SO_2	15 minutes	27.4	27.4	3.8	266	1.4%
	1 hour	17.6	16.8	2.2	350	0.6%
	Daily	0.9	0.9	0.2	125	0.2%
Nitrosamine 2	Annual	0.000	0.000	0.0004	0.2	0.2%
Nitramine 2	Annual	0.002	0.002	0.002	0.2	**1.1%**
Aldehyde	Annual	0.009	0.009	0.009	5	0.2%
London Borough of Barking and Dagenham – Barking Town Centre AQFA						
NO_2	1 hour	8.8	8.9	0.1	200	0.03%
	Annual	0.1	0.1	0.0	40	0.02%
SO_2	15 minutes	21.0	20.0	1.5	266	0.5%
	1 hour	12.3	11.7	-0.1	350	-0.02%
	Daily	0.5	0.6	0.1	125	0.1%
Nitrosamine 2	Annual	0.000	0.000	0.0001	0.2	0.0%

Pollutant	Averaging Time	Baseline Max Mean PC (µg/m^3)	With Proposed Scheme Max Mean PC (µg/m^3)	Max Adverse Impact (µg/m^3)	Max Beneficial Impact (µg/m^3)	Max Adverse as % of Objective
Nitramine 2	Annual	0.001	0.001	0.001	0.2	0.4%
Aldehyde	Annual	0.005	0.006	0.006	5	0.1%
Royal Borough of Greenwich – A206 Plumstead Road AQFA						
NO_2	1 hour	15.4	19.0	4.8	200	2.4%
	Annual	0.3	0.4	0.1	40	0.2%
SO_2	15 minutes	37.8	46.0	13.9	266	5.2%
	1 hour	20.1	24.5	6.5	350	1.8%
	Daily	1.0	1.3	0.3	125	0.2%
Nitrosamine 2	Annual	0.000	0.000	0.0001	0.2	0.1%
Nitramine 2	Annual	0.001	0.001	0.001	0.2	0.6%
Aldehyde	Annual	0.020	0.020	0.020	5	0.4%

Potential Effects on Ecological Receptors

5.8.55. In this section, the contribution of the Proposed Scheme to air pollution are presented as maximum ground level concentrations and deposition levels at the identified designated sites. The impact of the Proposed Scheme represents the change in concentrations or deposition between the Baseline and the Proposed Scheme.

Ammonia

5.8.56. The maximum modelled PEC annual mean concentrations of ammonia at each designated site, based on five years of meteorological data, are presented in **Table 5-21**. Concentrations are presented for both the Baseline and with Proposed Scheme scenarios. Impacts of the Proposed Scheme which cannot be screened out as being insignificant (>1% of the relevant level or load) are shown in bold.

5.8.57. The impacts of the operation of the Proposed Scheme on concentrations of NH_3 are insignificant (≤1% of the critical level) at all but four designated sites (Ingrebourne Marshes SSSI, Inner Thames Marshes SSSI, Crossness LNR and Rainham Marshes LNR).

5.8.58. The air quality impact of the Proposed Scheme on NH_3 at Ingrebourne Marshes SSSI equates to 2.8% of the critical level. The PEC under both the Baseline and Proposed Scheme scenarios exceeds the Critical Level (1µg/m^3) at Ingrebourne Marshes and, as such, the contribution of the Proposed Scheme is minimal compared to the background concentrations. However, significant effects at Ingrebourne Marshes cannot be screened out and the preliminary results of the assessment are reported within **Chapter 7: Terrestrial Biodiversity (Volume 1)** of this PEIR.

5.8.59. The air quality impact of the Proposed Scheme on NH_3 at both Inner Thames Marshes SSSI and Rainham Marshes LNR equates to 1.7% of the Critical Level. The Critical Level at these designated sites is 3µg/m^3 and is not exceeded under either the Baseline or Proposed Scheme scenarios. Therefore, the effects at Inner Thames Marshes SSSI and Rainham Marshes LNR with respect to NH_3 resulting from the Proposed Scheme can be screened as **Not Significant**.

5.8.60. The air quality impact of the Proposed Scheme on NH_3 at Crossness LNR equates to 2.0% of the Critical Level (1µg/m^3). The PEC under both the Baseline and Proposed Scheme scenarios exceeds the Critical Level, with the NH_3 contribution from the Proposed Scheme being negligible in comparison to the high background NH_3. Significant effects at Crossness LNR cannot be screened out, and the the preliminary results of the assessment are reported within **Chapter 7: Terrestrial Biodiversity (Volume 1)** of this PEIR.

Table 5-21: Modelled Maximum Operational Phase Impacts at Ecological Receptors for Annual Mean NH_3 (CLe = Critical Level)

Receptor	Critical Level (µg/m^3)	Max Baseline PEC (µg/m^3)	Max Proposed Scheme PEC (µg/m^3)	Max Impact (µg/m^3)	Impact as % of CLe	Max Proposed Scheme PEC as % of CLe
Epping Forest – SAC, SSSI	1	2.1	2.1	0.0008	0.08%	205.7%
Grays Thurrock Chalk Pits - SSSI	3	1.4	1.4	0.0017	0.06%	48.1%
Ingrebourne Marshes - SSSI	1	1.6	1.6	0.0280	**2.8%**	158.9%
Inner Thames Marshes - SSSI	3	1.7	1.7	0.0501	**1.7%**	57.5%
Oxleas Woodlands - SSSI	1	1.8	1.8	0.0043	0.4%	177.9%
West Thurrock Lagoon and Marshes - SSSI	3	1.4	1.4	0.0005	0.02%	47.7%
Crossness - LNR	1	1.6	1.6	0.0195	**2.0%**	162.9%
Lesnes Abbey Woods - LNR	1	1.7	1.7	0.0072	0.7%	168.0%
Rainham Marshes - LNR	3	1.7	1.7	0.0501	**1.7%**	57.5%

Nitrogen Oxides and Sulphur Dioxide

5.8.61. The maximum modelled PEC annual mean concentrations of NO_x and SO_2 at each designated site, based on five years of meteorological data are presented in **Table 5-22**. Concentrations are presented for both the Baseline and with Proposed Scheme scenarios. Impacts of the Proposed Scheme which cannot be screened out as being insignificant (>1% of the relevant level or load) are shown in bold.

5.8.62. The impacts of the operation of the Proposed Scheme on annual mean concentrations of NO_x are insignificant (≤1% of the critical level) at all but three designated sites (Inner Thames Marshes SSSI, Rainham Marshes LNR and Crossness LNR).

5.8.63. The air quality impact of the Proposed Scheme on NO_x at Crossness LNR, which is located partly within the Proposed Scheme Site Boundary, equates to 1.2% of the critical level. However, the Critical Level (30µg/m^3) is not exceeded under either the Baseline or Proposed Scheme scenarios and, as such, the effects at Crossness LNR can be determined to be insignificant.

5.8.64. The air quality impact of the Proposed Scheme on annual mean NO_x at both Inner Thames Marshes SSSI and Rainham Marshes LNR equates to 2.8% of the Critical Level. The Critical Level at these designated sites is 30µg/m^3 and is exceeded under both the Baseline and Proposed Scheme scenarios. The baseline NO_x at Inner Thames Marshes SSSI and Rainham Marshes LNR is approximately 5µg/m^3 higher than that at Ingrebourne Marshes SSSI, 1km to the northeast, which does not have an exceedance of the NO_x Critical Level. The exceedance of the NO_x Critical Level at Inner Thames Marshes SSSI and Rainham Marshes LNR is largely dictated by the high background level.

5.8.65. However, the assessment of the PEC is conservative. It is based on using 2023 background NO_x data and concentrations are expected to significantly improve by the time that the Proposed Scheme is in operation, due to reductions in emissions from all sectors but specifically road transport and energy generation/industry. Moreover, the impacts have been modelled at full load operation and with emissions at the maximum permit levels for Riverside 1 and Riverside 2. Under normal operating conditions, pollutant emission rates (and hence impacts) will be considerably lower, even at high operating load, since typical emission concentrations are well within the maximum permitted levels. The preliminary results of the ecological receptor assessment with respect to Inner Thames Marshes SSSI and Rainham Marshes LNR are reported within **Chapter 7: Terrestrial Biodiversity (Volume 1)** of this PEIR.

5.8.66. The impacts of the operation of the Proposed Scheme on annual mean concentrations of SO_2 are insignificant (≤1% of the critical level) at all but three designated sites (Inner Thames Marshes SSSI and Rainham Marshes LNR). However, the background SO_2 concentrations are extremely low with respect to the Critical Level, and the PEC under both the Baseline and Proposed Scheme scenarios are not exceeded at any of the three sites where the impact is >1% of the Critical Level. Therefore, the impact of SO_2 at Inner Thames Marshes SSSI, Rainham Marshes LNR and Crossness LNR can be determined to be **Not Significant**.

Table 5-22: Modelled Maximum Operational Phase Impacts at Ecological Receptors for Annual Mean NO_x and SO_2

Receptor	Critical Level (µg/m³)		Max Baseline PEC (µg/m³)		Max Proposed Scheme PEC (µg/m³)		Max Impact (µg/m³)		Impact as % of CLe		Max Proposed Scheme PEC as % of CLe	
	NO_x	SO_2	NO_x	SO_2	NO_x	SO_2	NO_x	SO_2	NO_x	SO_2	NO_x	SO_2
Epping Forest – SAC, SSSI	30	10	35.8	4.1	35.8	4.1	0.009	0.002	0.03%	0.02%	119.2%	41.2%
Grays Thurrock Chalk Pits - SSSI	30	20	28.0	4.1	28.0	4.1	0.01	0.003	0.05%	0.02%	93.4%	20.7%
Ingrebourne Marshes - SSSI	30	10	25.5	4.5	25.8	4.6	0.29	0.07	1.0%	0.7%	85.9%	45.7%
Inner Thames Marshes - SSSI	30	20	30.6	4.7	31.4	4.9	0.8	0.2	**2.8%**	**1.10%**	104.7%	24.6%
Oxleas Woodlands - SSSI	30	10	25.8	4.2	25.8	4.2	0.06	0.01	0.2%	0.13%	86.1%	41.8%
West Thurrock Lagoon and Marshes - SSSI	30	-	55.2	-	55.2	-	0.02	-	0.06%	-	184.0%	-
Crossness - LNR	30	10	24.1	4.3	24.4	4.4	0.37	0.10	**1.2%**	1.0%	81.5%	44.0%
Lesnes Abbey Woods - LNR	30	10	23.2	4.2	23.3	4.2	0.11	0.03	0.4%	0.3%	77.7%	42.1%
Rainham Marshes - LNR	30	20	30.6	4.7	31.4	4.9	0.83	0.2	**2.8%**	**1.1%**	104.7%	24.6%

Nitrogen and Acid Deposition

5.8.67. The maximum modelled PEC annual nitrogen deposition rates at each designated site, based on five years of meteorological data, are presented in **Table 5-23**. Concentrations are presented for both the Baseline and Proposed Scheme scenarios. Impacts of the Proposed Scheme which cannot be screened out as being insignificant (>1% of the relevant level or load) are shown in bold.

5.8.68. Background levels of nitrogen deposition at all designated sites already exceed the lower range of the respective Critical Load, as reported in **Table 5-23**. Screening of the designated sites by the impact of the Proposed Scheme as a percentage of the relevant Critical Load indicates that all but four of the sites have a **Not Significant** nitrogen deposition impact.

5.8.69. The four designated sites which have a nitrogen deposition impact >1% of the relevant critical load include Ingrebourne Marshes SSSI, Inner Thames Marshes SSSI, Rainham Marshes LNR and Crossness LNR. At each of these sites, the nitrogen deposition impact resulting from operation of the Proposed Scheme are a small portion relative to the PEC under the Baseline scenario. Nevertheless, the impact on nitrogen deposition at Ingrebourne Marshes SSSI, Inner Thames Marshes SSSI, Rainham Marshes LNR and Crossness LNR cannot be screened out and the preliminary results of the assessment are reported within **Chapter 7: Terrestrial Biodiversity (Volume 1)** of this PEIR.

Table 5-23: Modelled Maximum Operational Phase Impacts at Ecological Receptors for Annual Nitrogen Deposition

Receptor	Critical Load (kgN/ha/yr)	Max Baseline PEC (kgN/ha/yr)	Max Proposed Scheme PEC (kgN/ha/yr)	Max Impact (kgN/ha/yr)	Impact as % of CLe	Max Proposed Scheme PEC as % of CLe
Epping Forest – SAC, SSSI	5	30.1	30.1	0.008	0.2%	601.4%
Grays Thurrock Chalk Pits - SSSI	N/A	-	-	-	-	-
Ingrebourne Marshes - SSSI	15	15.2	15.4	0.2	**1.2%**	102.5%
Inner Thames Marshes - SSSI	10	15.9	16.2	0.3	**3.4%**	162.1%
Oxleas Woodlands - SSSI	15	30.2	30.3	0.05	0.3%	201.9%
West Thurrock Lagoon and Marshes - SSSI	10	13.7	13.7	0.004	0.04%	136.8%
Crossness - LNR	10	15.2	15.4	0.139	**1.4%**	153.5%
Lesnes Abbey Woods - LNR	10	30.3	30.4	0.08	0.8%	304.0%
Rainham Marshes - LNR	10	15.9	16.2	0.3	**3.4%**	162.1%

5.8.70. The maximum modelled PEC annual acid deposition rates at each designated site, based on five years of meteorological data (2018-2022), are presented in **Table 5-24**. Concentrations are presented for both the Baseline and Proposed Scheme scenarios.

5.8.71. The impacts of the operation of the Proposed Scheme on annual mean concentrations of SO_2 are insignificant (≤1% of the critical level) at all of the designated sites where Critical Loads for acid deposition are available.

Table 5-24: Modelled Maximum Operational Phase Impacts at Ecological Receptors for Annual Acid Deposition (N/A shown where Habitat is not Sensitive to Acid Deposition)

Receptor	Critical Load (keq/ha/yr)	Max Baseline PC (keq/ha/yr)	Max Proposed Scheme PC (keq/ha/yr)	Max Impact (keq/ha/yr)	Impact as % of CLe
Epping Forest – SAC, SSSI	1.73	1.73	0.009	0.01	0.001
Grays Thurrock Chalk Pits - SSSI	N/A	-	-	-	-
Ingrebourne Marshes - SSSI	N/A	-	-	-	-
Inner Thames Marshes - SSSI	N/A	-	-	-	-
Oxleas Woodlands - SSSI	2.72	0.03	0.04	0.006	0.2%
West Thurrock Lagoon and Marshes - SSSI	N/A	-	-	-	-
Crossness - LNR	N/A	-	-	-	-
Lesnes Abbey Woods - LNR	N/A	-	-	-	-
Rainham Marshes - LNR	N/A	-	-	-	-

Emissions Of NO_2, PM_{10} and $PM_{2.5}$ From New Backup Power Generators (Ancillary Infrastructure)

5.8.72. This assessment will be presented in Chapter 5: Air Quality (Volume 1) of the ES once further operation phase information is available.

Marine Vessel Emissions of NO_2, PM_{10} and $PM_{2.5}$

5.8.73. This assessment will be presented in Chapter 5: Air Quality (Volume 1) of the ES once further operation phase information is available.

Air Quality Neutral Assessment and Air Quality Positive Statement

5.8.74. A formal statement setting out the evidence base for the design measures incorporated in the Proposed Scheme to satisfy the requirements for Air Quality Positive will be provided as a technical appendix to the ES.

5.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

5.9.1. This section sets out the additional design, mitigation and enhancement measures which are likely to be required to address the significant effects relevant for air quality.

CONSTRUCTION PHASE

5.9.2. A comprehensive list of the potential measures, commensurate to the identified low to medium risk of impacts reported in **Section 5.8**, is set out below. The ES will present those measures concluded to be appropriate for inclusion in the OCoCP to accompany the DCO application:

Communications

- Develop and implement a stakeholder communications plan to be implemented before work commences onsite.
- Develop and implement a Dust Management Plan (DMP) as an appendix to the CoCP, which may include measures to control other emissions. The level of detail will depend on the risk, including as a minimum the highly recommended measures in the IAQM dust Guidance[23] but also the desirable measures as appropriate for the Site. Additional measures may be required to ensure compliance with the Mayor of London's guidance[24]. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.

Site Management

- Hold regular liaison meetings with other high risk construction sites within 200m of the Site Boundary (if applicable), to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the offsite transport/deliveries which might be using the same strategic road network routes.
- The developer and contractor are to actively monitor the Site to ensure the control of dust and emissions. Dry and windy conditions increase the likelihood of dust and emissions being produced and dispersed, so extra site monitoring will take place during these times.

Monitoring

- Undertake daily onsite and offsite inspection, where receptors within 100m of Site Boundary (including roads) are nearby, to monitor dust, record inspection results, and make the log available to LBB when asked. This will include regular dust soiling checks of surfaces with cleaning if necessary.
- Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the London Borough of Bexley. Where possible commence baseline monitoring at least three months before work commences onsite. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction[51].

Preparing and Maintaining the Site

- Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used onsite. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Site operators are encouraged to install green walls, screens and/or other vegetation to minimise the impact of dust and pollution and to improve the local environment during construction.
- The Site will be bunded to prevent runoff.
- Hoardings, fencing, barriers and scaffolding will be regularly cleaned using wet methods.
- A change of shoes and clothes by staff and visitors before going offsite is promoted.

Operating Vehicle/Machinery and Sustainable Travel

- Impose and signpost a maximum speed limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of LBB, where appropriate).
- The use of river transport is encouraged during the construction of the Proposed Jetty, taking away the requirement for road usage.

Operations

- Ensure equipment is readily available onsite to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
- Inform the Environment Agency, London Fire and Emergency Planning Authority (LFEPA) or the UK Health Security Agency (UKHSA) if harmful substances are spilled.
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction.

Waste Management

- Any excess material will be reused or recycled on or offsite in accordance with appropriate legislation.
- The contractor will develop and implement a SWMP.

Measures Specific to Demolition

- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible to provide a screen against dust).
- Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as is practicable. Only remove the cover in small areas during work and not all at once.
- During dry or windy weather, material stockpiles and exposed surfaces will be dampened down using a water spray to minimise the potential for wind pick-up.

Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure aggregates are stored in bunded areas and, where practicable, are not allowed to dry out.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems.
- For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust.

Measured Specific to Trackout

- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Use water-assisted dust sweeper(s) on the access and local roads to remove, as necessary, any material tracked out of the Site.
- Install hard surfaces haul routes which are regularly damped down and cleaned.
- Inspect on-site haul routes for integrity and instigate necessary repairs as soon as practicable. Record all haul route inspections and subsequent actions in a logbook.
- Implement a wheel-washing system with rumble grids to dislodge accumulated dust and mud prior to leaving the site. Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit.
- Access gates to be located at least 10m from sensitive receptors where practicable.
- Avoid dry sweeping of large areas.
- Ensure vehicles covering dusty materials are covered before leaving the Site.

OPERATION PHASE

5.9.3. No further additional design, mitigation or enhancement measures are proposed for air quality based on the results presented. However, the environmental permit that will be required for the operation of the Proposed Scheme will consider detailed operational processes.

5.10. MONITORING

5.10.1. The outcome of the construction dust assessment (**Section 5.8**) indicates that dust monitoring should be undertaken during the construction phase of the Proposed Scheme.

5.10.2. Continuous dust monitoring will be undertaken at locations along the Site Boundary due to the potential effects of dust during construction of the Proposed Scheme. Alarms will be set up to alert the LBB when concentrations of dust/PM_{10}/$PM_{2.5}$ reach a certain threshold. IAQM Guidance on Monitoring in the Vicinity of Demolition and Construction Sites[51] will be used when designing the monitoring survey.

5.10.3. During operation the Proposed Scheme will be subject to continuous stack emissions monitoring as a requirement of the environmental permit.

5.11. RESIDUAL EFFECTS

5.11.1. **Table 5-25** below summarises the residual effects associated with the Proposed Scheme.

Table 5-25: Air Quality - Summary of Residual Effects

Description of the Effect		Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Construction Phase					
Dust, PM_{10} and $PM_{2.5}$	Dust soiling effects during demolition, earthworks, construction and trackout	Nearby places of work	**Minor to Moderate Adverse (not significant)**	Mitigation set out in **Section 5.9.**	**Negligible (not significant)**
	Human health effects during demolition	Nearby places of work	**Minor Adverse (not significant)**	Mitigation set out in **Section 5.9.**	**Negligible (not significant)**
	Ecological effects during demolition	Crossness LNR	**Minor Adverse (not significant)**	Mitigation set out in **Section 5.9.**	**Negligible (not significant)**
Emissions of NO_2, PM_{10} and $PM_{2.5}$ from operational NRMM	Human health effects from NRMM	Nearby places of work	**Negligible (not significant)**	Mitigation set out in **Section 5.9.**	**Negligible (not significant)**
Road traffic emissions of NO_2, PM_{10} and $PM_{2.5}$		This assessment will be presented in Chapter 5: Air Quality (Volume 1) of the ES.			
Marine vessel emissions of NO_2, PM_{10} and $PM_{2.5}$		This assessment will be presented in Chapter 5: Air Quality (Volume 1) of the ES.			

Description of the Effect		Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Operation Phase					
Changes To Emissions of Pollutants at Riverside Campus as a result of the Carbon Capture Facility	Impacts on human health (including within local authorities and air quality focus areas)	Any location of relevant exposure	**Negligible** for all pollutants except nitrosamines, nitramines and aldehydes **(not significant)**	Further sensitivity testing is required to set emissions limits for these pollutants which result in acceptable levels of risk.	**Slight Adverse (not significant)**
	Impacts on ecological receptors	Detailed assessment deferred to ES for Ingrebourne Marshes and Inner Thames Marshes SSSIs, and Crossness and Rainham Marshes LNRs. Not significant for other receptor sites			
	Impacts on ecological receptors	All designated sites except those above	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Emissions of NO_2, PM_{10} and $PM_{2.5}$ From New Backup Power Generators (Ancillary Infrastructure)		This assessment will be presented in Chapter 5: Air Quality (Volume 1) of the ES.			
Marine Vessel Emissions of NO_2, PM_{10} and $PM_{2.5}$		This assessment will be presented in Chapter 5: Air Quality (Volume 1) of the ES.			
Air Quality Neutral Assessment and Air Quality Positive Statement		A formal statement setting out the evidence base for the design measures incorporated in the Proposed Scheme to satisfy the requirements for Air Quality Positive will be provided as a technical appendix to the ES.			

5.12. NEXT STEPS

5.12.1. Further work to be completed and included in the ES comprises:

- The air quality assessment will be further developed and refined based on any relevant responses to the Statutory Consultation.
- Engagement with the Environment Agency about methodology for the assessment to be presented within the ES.
- Engagement with GLA/LBB on Air Quality Neutral Assessment and Air Quality Positive Statement.
- Updated baseline conditions information, where necessary, based on updates to national data and reports.
- The detailed assessment within the ES will involve a review of the air quality assessment presented in this chapter, based on further information as part of ongoing design development.
- Assessment of road traffic emissions of NO_2, PM_{10} and $PM_{2.5}$ (construction phase).
- Assessment of marine vessel emissions of NO_2, PM_{10} and $PM_{2.5}$ (construction and operation phase).
- Assessment of emissions of NO_2, PM_{10} and $PM_{2.5}$ from new backup power generators (Ancillary Infrastructure).
- Updated modelled based on the design evolution of the Site layout and any additional information from technology suppliers.
- Sensitivity testing of impacts on amines and degradation products including consideration of reaction rates, ambient pollutant concentrations and any available Carbon Capture technology specific information.
- Consideration of impacts of stack emissions of dioxins.

5.13. LIMITATIONS AND ASSUMPTIONS

5.13.1. The following limitations and assumptions have been identified.

BASELINE CONDITIONS

- The baseline information that has been collated and used in the assessment has been based on the most up to date information currently available.
- Where Defra or APIS background mapped pollutant data were not available for the Operational Study Area, specifically heavy metals, ambient monitored data were obtained from suitable monitoring sites, operated by Defra.
- The absence of background data for amines and nitrosamines in the UK represents a limitation to the assessment of operational phase impacts at human receptors.

CONSTRUCTION PHASE ASSESSMENT

- At the time of undertaking this preliminary assessment detailed information regarding construction activities and construction plant are not available. It is assumed that dump trucks, tracked excavators, diesel generators, asphalt spreaders, rollers, compressors and trucks will be utilised during construction of the Proposed Scheme.
- Given the results of the qualitative construction dust risk assessment, associated mitigation measures, and the review of receptors and baseline air quality conditions within the Construction Phase Study Area, the outcomes of the preliminary assessment of likely impacts and significance is unlikely to change once the aforementioned construction activity and traffic data are provided.

OPERATION PHASE ASSESSMENT

5.13.2. The operation phase air quality assessment has, where possible, adopted a conservative approach by applying the following assumptions to the atmospheric dispersion modelling study:

- Riverside 1 and Riverside 2 (once construction is complete and the facility is fully operational) waste incineration facilities will operate continuously, at full load as defined by their permitted annual tonnes of waste incinerated for all hours of the year.
- Emissions of pollutants (except metals) in the exhaust gases that are subject ELV were modelled at the associated emission limit for all hours of the year with all operational 'dust' emissions assumed to be in the $PM_{2.5}$ size fraction for particulate matter and therefore included, in total, in both the assessment of PM_{10} and $PM_{2.5}$.
- Exhaust gases post carbon capture are a minimum of 80 degrees Celsius.
- Metals were assumed to be emitted at the maximum percentages of the ELVs advised in Environment Agency guidance.
- Amine emissions are modelled using reaction rate constants for MEA and DMA. At this stage they are not process specific.
- Mass emissions of amines and nitrosamines from the Carbon Capture Facility were modelled at the maximum emission level for all hours of the year, based on indicative data provided by the various candidate technology suppliers.
- A 70%/35% conversion ratio of NO_x to NO_2 in the atmosphere was assumed for long and short term impacts, based on Environment Agency guidance[25].
- Deposition of amines, nitrosamines, and nitramines from the atmosphere were modelled using a deposition velocity equivalent to that for ammonia, which based on relevant research[47], is considered to be conservative.

- The maximum impact relating to each assessed designated site within the Operational Study Area has been reported, regardless of the specific area of the Site represented by the maximum and the presence or otherwise of particular habitats.
- The significance screening of maximum impacts at each designated site was undertaken against minimum recommended critical levels/critical loads.
- Assessment of maximum impacts for both human and ecological receptors has been undertaken across five years of hourly meteorological data.
- All amine concentration outputs from the dispersion model, which are based on non-specific primary and secondary amines (MEA/DMA), have been treated as MEA for comparison with the respective EALs. Furthermore, the nitrosamine outputs and the sum of all nitramine concentration outputs have been treated as NDMA for comparison with the relevant EAL.
- The use of the NDMA EAL for the assessment of nitramines in this assessment is conservative given that NDMA is considered to be one of the most toxic nitrosamines, with nitramines being considered notably less toxic based on preliminary toxicity studies[52].
- As detailed in **Appendix 5-2: Operation Phase Assessment (Volume 3)**, there are a number of input variables required to model atmospheric amine chemistry using the ADMS model. The modelling undertaken has utilised reaction rate coefficients for MEA and DMA, along with appropriate regional ambient concentration data for NO_2 and ozone, and published background hydroxyl radical data for the UK. However, as acknowledged by the Environment Agency, there is inherent uncertainty in the amines modelling process, meaning further sensitivity testing of the aforementioned variables is needed as part of the ES. This will include testing of a range of published reaction rate coefficients relevant to MEA and NDMA, respectively.

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DECARBONISATION

CHAPTER 6: NOISE AND VIBRATION

Cory Decarbonisation Project

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TABLE

6. NOISE AND VIBRATION

6.1. INTRODUCTION

6.1.1. This technical chapter reports the preliminary assessment of the likely significant effects of the Proposed Scheme resulting from noise and vibration during the construction and operation phases and describes:

- relevant policy, legislation and guidance;
- consultation and engagement undertaken to date;
- the methodology for assessment;
- potential effects resulting from the construction phase; and
- potential effects resulting from the operation phase.

6.1.2. A number of appendices support this technical chapter which have been identified below:

- **Appendix 6-1: Noise and Vibration Terminology (Volume 3)**
- **Appendix 6-2: Noise Monitoring (Volume 3)**
- **Appendix 6-3: Supplementary Acoustics Guidance and Policy Information (Volume 3)**
- **Appendix 6-4: Operational Noise Modelling (Volume 3)**
- **Appendix 6-5: Construction Noise and Vibration (Volume 3)**
- **Appendix 6-6: Uncertainty Matrix (Volume 3)**

6.1.3. This technical chapter is necessarily technical in nature; to aid the reader a glossary of acoustic terminology has been provided in **Appendix 6-1: Noise and Vibration Terminology (Volume 3)**.

6.2. POLICY, LEGISLATION, AND GUIDANCE

6.2.1. The policy, legislation, and guidance relevant to the assessment of noise and vibration for the Proposed Scheme is detailed in **Table 6-1**, with further information provided within **Appendix 6-3: Supplementary Acoustics Guidance and Policy Information (Volume 3)**.

Table 6-1: Noise and Vibration Summary of Key Policy, Legislation, and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011[1]	Sets out the Government's policy for delivery of major energy infrastructure and is currently the primary basis for decision making of applications that fall within the Planning Act 2008 regime. Section 5.11 (Noise and Vibration) includes reference to the NPSE[7], and also provides guidance on what information should be included in a noise assessment for a proposed development.
Draft Overarching National Policy Statement (NPS) for Energy EN-1 2023[2]	This Draft Overarching National Policy Statement for Energy (EN-1) is part of a suite of draft NPSs issued by the Secretary of State for Energy Security and Net Zero. It sets out the government's policy for delivery of major energy infrastructure and will likely replace the 2011 NPSs by the time the application for the Proposed Scheme is submitted. For noise and vibration, the 2023 Draft NPS EN-1 is largely the same as in the 2011 document. An addition relevant to the marine environment has been made which states in paragraph 5.12.11: *"In the marine environment, applicants should consider noise impacts on protected species, both at the individual project level and in-combination with other marine activities".*
National Planning Policy Framework (NPPF) 2023[3]	The NPPF sets out the Government's planning policies for England and how these should be applied, with the following paragraphs relating to noise: *"174. Planning policies and decisions should contribute to and enhance the natural and local environments by: [a number of points including]…* *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans";* *and* *"185. Planning policies and decisions should also ensure that new development is appropriate for its location taking into*

Policy, Legislation or Guidance	Description
	account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: • *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development - and avoid noise giving rise to significant adverse impacts on health and the quality of life[65]; and* • *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.…"* and *"187. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."*
The London Plan 2021[4]	The Spatial Development Strategy for Greater London setting out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policy D14 of the London Plan is the key policy specific to noise within Greater London, which states that: *"In order to reduce, manage and mitigate noise to improve health and quality of life, residential and other non-aviation development proposals should manage noise by:* • *avoiding significant adverse noise impacts on health and quality of life* • *reflecting the Agent of Change principle as set out in Policy D13 Agent of Change* • *mitigating and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on existing noise-generating uses*

Policy, Legislation or Guidance	Description
	• *improving and enhancing the acoustic environment and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity)* • *separating new noise-sensitive development from major noise sources (such as road, rail, air transport and some types of industrial use) through the use of distance, screening, layout, orientation, uses and materials – in preference to sole reliance on sound insulation* • *where it is not possible to achieve separation of noise-sensitive development and noise sources without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through applying good acoustic design principles* • *promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver".*
The Bexley Local Plan 2023[5]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development across the Borough. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan.
London Environment Strategy 2018[6]	The London Environment Strategy seeks to ensure that London will become a "*zero carbon city by 2050*" by setting out policies and proposals in seven policy areas to address environmental challenges, including the transition to a low carbon circular economy. The Mayor wants to ensure "*London's businesses and workers are supported to be able to compete effectively in, and benefit from, this growing global market"*. The London Environment Strategy seeks to ensure that "*Londoners' quality of life will be improved by reducing the number of people adversely affected by noise and promoting more quiet and tranquil spaces*".
Noise Policy Statement for England (NPSE) 2010[7]	Seeks to ensure that noise matters are considered at the right time during the development of policy and decision making, and not in isolation. It highlights the underlying principles on noise management already found in existing legislation and guidance. Specifically, the NPSE aims, in paragraph 1.7, "*through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development: avoid significant adverse impacts on health and quality of life;*

Policy, Legislation or Guidance	Description
	mitigate and minimise adverse impacts on health and quality of life; and where possible, contribute to the improvement of health and quality of life".
South East Inshore Marine Plan 2021[8]	The South East Inshore Marine Plan area stretches from Felixstowe in Suffolk to west of Dover in Kent and incorporates the River Thames. It will help to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan area. Policy SE-UWN-1 states that "*Proposals that result in the generation of impulsive sound must contribute data to the UK Marine Noise Registry as per any currently agreed requirements. Public authorities must take account of any currently agreed targets under the Marine Strategy Part One Descriptor 11*". In addition, Policy SE-UWN-2 advises that "*proposals that result in the generation of impulsive or non-impulsive noise must demonstrate that they will, in order of preference:* • avoid • minimise • mitigate – adverse impacts on highly mobile species so they are no longer significant *If it is not possible to mitigate significant adverse impacts, proposals must state the case for proceeding".*
Legislation	
Environment Act 2021[9]	The Environment Act 2021 makes provision about targets, plans and policies for improving the natural environment. In relation to noise and vibration and the Proposed Scheme, there is nothing specific in this Act that would influence the assessment methodology.
Control of Pollution Act 1974[10]	The Act contains provisions relating to a wide range of environmental pollution matters, including construction noise, and the obtaining consents in relation to construction noise effects.
Environmental Protection Act 1990[11]	The Environmental Protection Act makes provision for the improved control of pollution arising from certain industrial and other processes and, amongst many other things, requires local authorities to issue a noise abatement notice where it is satisfied that a noise nuisance exists.

Policy, Legislation or Guidance	Description
Guidance	
National Planning Practice Guidance (2021)[12]	Guidance relating to the processes and tools that can be used through the planning system in England. It includes guidance relating to how planning can manage potential noise effects in new development.
British Standard (BS) 5228:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites (Part 1: Noise and Part 2: Vibration)[13]	BS 5228:2009+A1:2014 sets out a method for measuring and predicting noise from construction works, as well as recommendations for basic methods of vibration control relating to construction sites.
BS 4142: 2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound[14]	BS 4142: 2014+A1:2019 provides an assessment method for noise arising from commercial noise sources, including external plant and onsite vehicle movements and unloading at residential receptors.
BS 7445:2003 - Description and Measurement of Environmental Noise[15]	BS 7445:2003 provides a description of the quantities and methods used when measuring outdoor environmental noise.
Calculation of Road Traffic Noise (CRTN) 1988[16]	This technical memorandum describes the procedures for measuring and calculating noise from road traffic. It is used to calculate the change in noise level from construction and development generated road traffic.
Design Manual for Roads and Bridges (DMRB), Sustainability & Environment Appraisal: LA 111 Noise and Vibration 2020[17]	LA 111 sets out the requirements for noise and vibration assessments from road projects, applying a proportionate and consistent approach using best practice and ensuring compliance with relevant legislation. It is commonly used to assess the magnitude of impact of any change in noise level from construction generated road traffic.

Policy, Legislation or Guidance	Description
ISO 9613: Acoustics - Attenuation of Sound During Propagation Outdoors - Part 2: General Method of Calculation 1996[18]	The document describes a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources.
BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings[19]	The guidance provided in BS 8233:2014 includes appropriate internal and external noise level criteria, which are applicable to dwellings exposed to steady external noise sources.

6.3. SCOPING OPINION AND CONSULTATION

6.3.1. An EIA Scoping Opinion[20] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26th May 2023. The responses from the Planning Inspectorate and statutory consultees in relation to noise and vibration and how these requirements should be addressed by the Applicant are set out in **Table 6-2**.

Table 6-2: Summary of the EIA Scoping Opinion in Relation to Noise and Vibration

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Planning Inspectorate			
3.2.1	Assessment of noise and vibration impacts on ecological receptors and heritage receptors from the Noise and Vibration ES Chapter	*"The Scoping Report proposes that the assessment of noise and vibration impacts on ecological receptors will be presented in ES Chapter 6: Terrestrial Biodiversity and ES Chapter 7: Marine Biodiversity; while impacts to heritage receptors would be considered in ES Chapter 8: Heritage.* *The Inspectorate is content with this approach. The Noise and Vibration ES Chapter should provide clear cross-referencing to where the relevant impacts are considered."*	Cross-referencing has been included in this technical chapter and will also be included in the ES.
3.2.2	Vibration from sources other than vehicle movements on the surrounding road network – construction	*"The Inspectorate notes the presence of workplaces and infrastructure in proximity to the application site and does not consider that sufficient evidence has been provided to demonstrate the absence of a pathway for significant effects. The Inspectorate is therefore not in agreement that this matter can be scoped out. The ES should assess impacts to relevant receptors from construction vibration (from sources other than vehicle movements on the*	The nearest non-residential receptors are (from the main area of construction works to the edge of the receptor): • Riverside 1, located to the north, within the Site; • Asda ASC Recycling Centre located approximately 70m to the east of the Proposed Scheme; • Asda Belvedere Distribution Centre located approximately 110m to the east of the Proposed Scheme; and

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		surrounding road network) where significant effects are likely."	• Iron Mountain Records Storage Facility, located approximately 170m east of the Proposed Scheme. Riverside 1 is not considered to be noise or vibration sensitive given the existing industrial uses onsite. The Iron Mountain Records Storage Facility, the Asda Belvedere Distribution Centre and the Asda ASC Recycling Centre are not considered to be noise or vibration sensitive. This is further justified as all will have machinery working within the buildings and/or within the associated loading areas. Furthermore, at distances of 70m and greater, it is considered, based on professional experience, that vibration generated would be minimal. This is evidenced as at a distance of 70m, the predicted vibration as a result of a twin-drum vibratory roller in operation is 0.1 mm/s in terms of the peak particle velocity, which would be considered "*just perceptible in the most sensitive situations*" (as stated in BS 5228:2009+A1:2014-2[12]) and typically aligns with a negligible magnitude of impact. Furthermore, the vibration criteria for building damage (rather than for human response/disturbance) are of such a magnitude

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			(15mm/s peak particle velocity for unreinforced or light framed structures, as presented in BS 5228:2009+A1:2014-2[12]) that any impacts are considered unlikely and insignificant. Notwithstanding this, the mitigation measures outlined in **Section 6.7** and **Section 6.9** will minimise the levels of vibration as far as practicable, thereby minimising any potential impact on nearby non-residential spaces.
3.2.3	Vibration from vehicle movements on the surrounding road network – construction	*"Based on the temporary duration of construction traffic movements and the nature of the surrounding land use, the Inspectorate is in agreement that an assessment of construction vibration from vehicle movements on the surrounding road network can be scoped out of the ES."*	No response required.
3.2.4	Vibration from sources other than traffic – operation	*"Given the nature of the Proposed Development, the Inspectorate is content that impacts from operational vibration (from sources other than traffic) are not likely to result in significant effects. This matter can be scoped out."*	No response required.
3.2.5	Vibration from additional traffic – operation	*"In the absence of certainty around how hydrogen would be transported during operation (potentially via hydrogen tube trailers of unknown frequency), the Inspectorate is not in a position to scope out*	As described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer included in the scope of the Proposed Scheme. Consequently, there will be a very limited number

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		this matter. If operational traffic movements would occur within 16 metres of the flood defence, the ES should provide an assessment of any likely significant effects on the flood defence resulting from vibration."	of heavy vehicle movements during the operation phase and it is considered that this aspect can remain scoped out (see **Chapter 18: Landside Transport (Volume 1)** for vehicle numbers).
3.2.6	Underwater noise – operation	*"The Inspectorate is content that an assessment of underwater noise during operation can be scoped out of the Noise and Vibration ES Chapter. The Scoping Report (Table 7-7) confirms that impacts on fish and marine mammals from underwater noise during operation and maintenance are to be assessed in the ES Marine Biodiversity Chapter."*	No response required.
3.2.7	Study Area	*"The Scoping Report states that the study area is 300m for construction noise, 600m for construction traffic and 600m for operational noise. Whilst paragraph 5.4.2 of the Scoping Report details the potential to extend the operational study area, the Scoping Report does not state whether the construction phase study area is subject to extension based on the results of assessment.* *The Inspectorate considers that an extension should be considered to include a wider area of receptors and to take into consideration any as*	The construction assessment described in **Section 6.4**, demonstrates that the Study Areas proposed (see **Section 6.5**) are sufficient to capture receptors potentially affected by construction or operation impacts of the Proposed Scheme as all residual effects are negligible or minor (not significant).

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		yet unconfirmed variables such as construction and piling methods which may give rise to increased noise."	
3.2.8	Sensitive receptors	*"The Scoping Report states that places of work, including the existing Riverside campus facility, are not considered to be noise sensitive.* *The Scoping Report does not provide any evidence to support this.* *The ES should provide a detailed description of receptor sensitivity as part of a justification for omitting nearby receptors from assessment."*	The nearest non-residential receptors are (from the main area of construction works to the edge of the receptor): • Riverside 1, located to the north within the Site; • Asda ASC Recycling Centre located approximately 70m to the east of the Proposed Scheme; • Asda Belvedere Distribution Centre located approximately 110m to the east of the Proposed Scheme; and • Iron Mountain Records Storage Facility, located approximately 170m east of the Proposed Scheme. Riverside 1 is not considered to be noise or vibration sensitive given the existing industrial uses onsite. The Iron Mountain Records Storage Facility, the Asda Belvedere Distribution Centre and the Asda ASC Recycling Centre are not considered to be noise or vibration sensitive. In addition, all these receptors will have machinery working within the

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			buildings and/or within the associated loading areas.
3.2.9	Underwater noise assessment	*"The Scoping Report does not provide a commitment to undertaking an underwater noise (acoustic) assessment, explaining this would be determined at a later date when more detailed information on the Proposed Development is available. The Applicant should make effort to discuss and agree the need for an underwater acoustic assessment and any baseline data required to inform such an assessment, with relevant consultation bodies."*	Noise levels and their effects on fish and marine mammals will be determined as the design of the Proposed Scheme progresses. An underwater noise study will be undertaken to support the marine biodiversity assessment that will be presented in **Chapter 8: Marine Biodiversity (Volume 1)** of the ES. This will be undertaken for fish of Regional/County to National importance (including hearing specialist species (e.g., herring)); and marine mammals of National importance (i.e., common seal, grey seal and harbour porpoise). Consultation and engagement will be undertaken with relevant consultation bodies throughout the assessment.
LBB			
N/A	Noise and Vibration	Within the EIA Scoping Opinion, LBB confirmed that it will "*expect the majority of noise works to be undertaken during our prescribed core hours of 08:00 to 18:00 hours Mondays to Fridays and 08:00 to 13:00 hours on Saturdays with no noisy works on Sundays/Public Holidays.* *It is anticipated that the applicant's appointed contractors will enter into formal prior consent*	As LBB is generally satisfied with the assessment methodology set out in Chapter 6: Noise and Vibration of the EIA Scoping Report[21], it has not been contacted further. Construction impacts will be managed through the CoCP (developed based on the OCoCP to be submitted as part of the application for development consent). Further information about the construction working hours

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		arrangements with the Council under the provisions of section 61 of the Control of Pollution Act 1974. This allows for appropriate dispensations as required".	is included in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.
Mayor's Office for Policing and Crime (MOPAC)			
N/A	Noise and Vibration	"*The proposed assessment methodology and approach stated in the noise and vibration chapter for ascertaining baseline conditions are considered to be appropriate, however, vibration impacts should be considered for buildings as well as human receptors*."	The nearest non-residential receptors are (from the main area of construction works to the edge of the receptor): • Riverside 1, located to the north within the Site; • Asda ASC Recycling Centre located approximately 70m to the east of the Proposed Scheme; • Asda Belvedere Distribution Centre located approximately 110m to the east of the Proposed Scheme; and • Iron Mountain Records Storage Facility, located approximately 170m east of the Proposed Scheme. Riverside 1 is not considered to be noise or vibration sensitive given the existing industrial uses onsite. The Iron Mountain Records Storage Facility, the Asda Belvedere Distribution Centre and the Asda

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			ASC Recycling Centre are not considered to be noise or vibration sensitive. In addition, all these receptors will have machinery working within the buildings and/or within the associated loading areas. At distances of 70m and greater, it is considered, based on professional experience that vibration generated would be minimal. This is evidenced as at a distance of 70m, the predicted vibration as a result of a twin-drum vibratory roller in operation is 0.1 mm/s in terms of the peak particle velocity, which would be considered "*just perceptible in the most sensitive situations*" (as stated in BS 5228:2009+A1:2014-2[12]) and typically aligns with a negligible magnitude of impact. Furthermore, the vibration criteria for building damage (rather than for human response/disturbance) are of such a magnitude (15mm/s peak particle velocity for unreinforced or light framed structures, as presented in BS 5228:2009+A1:2014-2[12]) that any impacts are considered unlikely and insignificant. Notwithstanding this, the mitigation measures outlined in **Section 6.7** and **Section 6.9** will minimise the levels of vibration as far as

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			practicable, thereby minimising any potential impact on nearby non-residential spaces.
Environment Agency			
N/A	Underwater Noise	*"Underwater noise has been scoped in, apart from that caused by vessel movements. We agree with this approach.* *The marine works are likely to require piling. Fish populations and migratory fish have the potential to be negatively impacted by piling noise and this will need to be addressed. Disturbance from piling activities during construction, may well be significant in terms disturbance or delay to migratory activity, or negative impacts from direct physical injury to less motile fish species or life stages. The extent of any piling noise will need to be assessed in terms of its propagation across the whole river channel and any acoustic barrier to migratory activity or associated risks to fish. Avoiding sensitive periods and selecting non-percussive piling methods are typically used to mitigate negative impacts on fish communities in the Thames.* *British Standard (BS) 5228: 2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites (Part 1: Noise and*	Noise levels and their effects on fish and marine mammals will be determined as the design of the Proposed Scheme progresses. An underwater noise study will be undertaken to support the marine biodiversity assessment that will be presented in Chapter 8: Marine Biodiversity (Volume 1) of the ES. This will be undertaken for fish of Regional/County to National importance (including hearing specialist species (e.g., herring)); and marine mammals of National importance (i.e., common seal, grey seal and harbour porpoise).

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		Part 2: Vibration) is a key document to consider the vibration and appropriate management of vibration. We welcome its inclusion".	
		"We require that vibration be scoped in. *The vibration from construction activities (e.g., extraction of pile and ancillary equipment, plant, piling, traffic etc) should be included within the scope. Thresholds for vibration should be submitted to the Environment Agency for approval as part of a monitoring strategy during the construction phase to help protect the primary flood defence from adverse effects.* *Vibration for traffic on site for operation within 16 metres of the flood defence should be scoped in to ensure the flood defence is not adversely affected by the proposal."*	Vibration from demolition of the Belvedere Power Station Jetty (disused) and piling works associated with the Proposed Jetty on marine mammals and other marine receptors will be reviewed and assessed in Chapter 8: Marine Biodiversity (Volume 1) of the ES. No traffic is expected within 16m of the flood defence, therefore it is scoped out of this assessment. However, this will be reviewed and assessed, if necessary, in the ES.
PLA			
N/A	Noise and Vibration	*"Within table 7-7 of this chapter, for impacts scoped in or out of further assessment, it is noted that noise and vibration (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC), marine habitats, intertidal and subtidal benthic communities and marine plants and macroalgae) have been scoped out. To confirm one of the reasons the River Thames and its Tidal*	Noise levels and their effects on fish and marine mammals will be determined as the design of the Proposed Scheme progresses. An underwater noise and vibration study will be undertaken to support the marine biodiversity assessment that will be presented in Chapter 8: Marine Biodiversity (Volume 1) of the ES. This will be undertaken for fish of Regional/County to

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		Tributaries SINC was designated was because of the river's importance for spawning and migrating fish. Therefore, noise and vibration have the potential to affect the migration and spawning of fish, and consideration should be given to scoping this in for the Environmental Statement."	National importance (including hearing specialist species (e.g., herring)); and marine mammals of National importance (i.e., common seal, grey seal and harbour porpoise), including species related to the designation of the Thames and its Tidal Tributaries SINC.

6.3.3. No further engagement or consultation has been undertaken to inform the noise and vibration assessment to date.

6.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

6.4.1. The noise assessment of the Proposed Scheme has been undertaken in line with the legislation, policy and guidance described in **Section 6.2** of this technical chapter.

POTENTIAL SIGNIFICANT EFFECTS

6.4.2. As identified in the EIA Scoping Report[21], the following effects are considered to be significant and have been considered further in this assessment:

- Construction Phase:
  - Noise effects arising during the construction phase of the Proposed Scheme (construction noise – landside).
  - Underwater noise/vibration effects arising during the demolition of the Belvedere Power Station Jetty (disused) and construction phase of the Proposed Scheme on marine receptors (i.e., marine mammals, hearing specialist fish species) (construction noise – marine receptors).
  - Noise impacts arising from construction vehicles on the surrounding road network (construction road traffic noise).
- Operation Phase:
  - Noise effects arising from the operation of the Proposed Scheme (landside only).
  - Underwater noise/vibration effects arising from maintenance dredging on marine receptors (i.e., marine mammals, hearing specialist fish species).

MATTERS SCOPED OUT

6.4.3. The following effects are considered unlikely to be significant and therefore have not been considered further in this assessment:

- Construction Phase:
  - Vibration effects arising during the construction phase of the Proposed Scheme on landside receptors. Vibration effects arising from construction vehicles on the surrounding road network.
- Operation Phase:
  - Vibration effects arising from the operation of the Proposed Scheme.
  - Noise impacts arising from additional traffic as a result of the operation of the Proposed Scheme (the Hydrogen Project is no longer included in the scope of the Proposed Scheme).
  - Vibration effects arising from additional traffic as a result of the operation of the Proposed Scheme.

- Noise impacts on landside receptors arising from additional vessel movements. It is expected that up to five vessels will call at the Proposed Jetty each week to collect and transport CO_2 from the Proposed Scheme. Based on the information presented in **Chapter 19: Marine Navigation (Volume 1)**, there are already numerous vessel movements within this stretch of water. Consequently, the proposed additional movements from the Proposed Scheme are not anticipated to result in any significant adverse effects.
- Underwater noise and vibration effects arising from additional vessel movements on marine receptors (i.e., marine mammals, hearing specialist fish species).

SENSITIVE RECEPTORS

6.4.4. The following sensitive receptors have been identified and will be considered within the noise and vibration impact assessment:

- Residential properties including those on:
  - Clydesdale Way (approximately 110m southeast of the Site Boundary);
  - North Road (approximately 200m southeast of the Site Boundary);
  - Norman Road (approximately 200m south of the Site Boundary);
  - Poppy Close (approximately 200m southeast of the Site Boundary);
  - Little Brights Road (approximately 210m southeast of the Site Boundary); and
  - Gypsy and traveller site, located off Jenningtree Way (approximately 500m southeast of the Site Boundary).
- Hospitality facilities including:
  - Travelodge London Belvedere (approximately 90m southeast of the Site Boundary).
- Locally designated ecological sites, including:
  - Crossness LNR (partly located within the Site).

6.4.5. Transient sensitive receptors, for example the users of any PRoW, are not considered relevant to the noise and vibration assessment as they are only using the space temporarily.

6.4.6. The Iron Mountain Records Storage Facility, the Asda Belvedere Distribution Centre and the Asda ASC Recycling Centre are not considered to be noise or vibration sensitive given all will have machinery working within the buildings and/or within the associated loading areas.

6.4.7. The assessment of noise and vibration impacts on ecological receptors will be presented in Chapter 7: Terrestrial Biodiversity (Volume 1) of the ES and Chapter 8: Marine Biodiversity (Volume 1) of the ES. An assessment has not been completed at the time of writing the PEIR due to the modelling to complete the assessment not yet being available.

6.4.8. Places of work, including Riverside 1, are not considered to be noise or vibration sensitive receptors. This is supported by the guidance within LA 111[16], which states that examples of noise and vibration sensitive receptors include dwellings, hospitals, healthcare facilities, education facilities, community facilities, international and national or statutorily designated sites, public rights of way, cultural heritage assets and buildings containing vibration sensitive equipment.

BASELINE DATA COLLECTION

6.4.9. To quantify the existing baseline noise levels at the nearest noise sensitive receptors, as identified in **Section 6.6** a baseline noise survey was carried out at three measurement positions between 16th March to the 21st March 2023. Continuous noise measurements were taken at three locations considered representative of the nearest noise sensitive receptors. Table A6-4 within **Appendix 6-2: Noise Monitoring (Volume 3)** presents the location of each measurement position (MP), with a summary presented below:

- MP1 – representative of the prevailing noise levels at the Travelodge London Belvedere and residential dwellings on Clydesdale Way, North Road, Norman Road, Poppy Close and Little Brights Road;
- MP2 - representative of the noise levels close to the A2016 Eastern Way; and
- MP3 - representative of the noise levels along the western boundary of the Site, and on Crossness LNR.

6.4.10. Measurements were taken in accordance with BS 7445:2003[15] and BS 4142: 2014+A1:2019[14]. Meteorological conditions were conducive to obtaining accurate and reliable noise data.

6.4.11. All measurements were made using Class 1 sound monitoring equipment. All sound level meters had been calibrated to traceable standards within the previous 24 months, and the calibrator within the previous 12 months. All the sound level meters were calibrated on site at the beginning and end of the monitoring periods. Any drifts in calibration level were within accepted tolerances.

6.4.12. A summary of the results obtained from these measurements is presented in **Table 6-7**. Detailed day-by-day data per measurement position is presented in **Appendix 6-2: Noise Monitoring (Volume 3)**.

CONSTRUCTION PHASE ASSESSMENT METHODOLOGY

Construction Noise - Landside

6.4.13. An assessment of temporary construction noise impacts has been undertaken in line with the guidance contained in BS 5228:2009+A1:2014, and in consideration of the Lowest Observed Adverse Effect Levels (LOAEL) and Significant Observed Adverse Effect Levels (SOAEL). These terms are taken from national noise policy, most notably the NPSE[7]:

- LOAEL – the level above which adverse effects on health and quality of life can be detected; and
- SOAEL – the level above which significant adverse effects on health and quality of life occur.

6.4.14. The scope and level of detail of the assessment undertaken is considered to be proportionate to the risk of a potential likely significant adverse effect occurring.

6.4.15. The baseline noise environment for the construction assessment has been quantified using data from the noise survey described in **Section 6.6**.

6.4.16. Construction noise levels at the façade of the nearest sensitive receptors to each area of works have been predicted based on the likely plant items (type, quantity and location), construction activities and proposed construction programme. A degree of professional judgement has been required to pragmatically group sensitive receptors and activities where appropriate.

6.4.17. The magnitude and significance of effects for construction noise have been determined by comparing predicted construction noise levels with the defined LOAEL and SOAEL values. The methodology for defining values for LOAEL and SOAEL is explained in the next paragraph, and the methodology for determining the magnitude and significance of effect is subsequently presented.

6.4.18. The LOAEL for each time period (day, evening/weekends and night) has been set as the baseline noise level for each receptor or group of receptors. The SOAEL has been set as the threshold level determined using section E.3.2 and Table E.1 of BS 5228:2009+A1:2014-1 (the ABC method)[13], which is replicated in **Table 6-3**. Further information and detail on BS 5228 and the ABC method is presented in **Appendix 6-3: Supplementary Acoustics Guidance and Policy Information (Volume 3)**.

Table 6-3: Threshold of Potential Significant Adverse Construction Noise Effects used to Determine the SOAEL

Assessment Category and Threshold Value Period	Threshold Value, in decibels (dB, $L_{Aeq, T}$)		
	Cat. A [A)]	Cat. B [B)]	Cat. C [C)]
Night-time (23:00 −07:00)	45	50	55
Evenings and weekends [(D)]	55	60	65
Daytime (07:00 −19:00) and Saturdays (07:00−13:00)	65	70	75
NOTE 1 - A potential significant adverse 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 adverse effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise.			
NOTE 3 - Applied to residential receptors only.			
A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.			
B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as Category A values.			
C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than Category A values.			
D) 19:00–23:00 weekdays, 13:00–23:00 Saturdays and 07:00–23:00 Sundays.			

6.4.19. Note 1 to the table states "*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*". On this basis, and continuing the theme of 5dB step widths, **Table 6-4** has been drawn-up for the initial determination of the potential for significant effects in relation to construction noise. Both daytime and night-time periods have been considered.

6.4.20. Any evening or weekend working would only be required for marine construction activities (Proposed Jetty) (unless otherwise agreed by LBB). The night-time assessment represents a worst-case scenario to determine the potential impacts at the nearest human receptors (approximately 950m to the south of the Proposed Jetty), and therefore the evening and weekend periods have not been assessed. Further information on construction working hours is provided in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

Table 6-4: Significance Scale for the Assessment of Noise during Construction Works

Significance	Magnitude of Impact	BS 5228:2009+A1:2014-1 Threshold Level (dB $L_{Aeq,T}$), according to Category and Period					
		Day (08:00-18:00)			Night (23:00-07:00)		
		Cat A	Cat B	Cat C	Cat A	Cat B	Cat C
Significant	Major	>70	>75	>80	>50	>55	>60
	Moderate	65 – 70	70 – 75	75 – 80	45 – 50	50 – 55	55 – 60
Not significant	Minor	60 – 65	65 – 70	70 – 75	40 – 45	45 – 50	50 – 55
	Negligible	<60	<65	<70	<40	<45	<50

6.4.21. Construction noise may be considered a significant adverse effect where it is determined that a major or moderate magnitude of impact will occur to a noise sensitive receptor for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights; or
- A total number of days exceeding 40 in any six consecutive months.

6.4.22. Any negligible or minor impacts are deemed not significant.

Construction Noise – Marine Receptors

6.4.23. An underwater noise and vibration assessment will be provided in Chapter 8: Marine Biodiversity (Volume 1) of the ES to determine whether the resultant noise and vibration levels are predicted to exceed the tolerant thresholds for marine species during the demolition of the Belvedere Power Station Jetty (disused) and construction works, and if so, to determine the scope of any further required assessments. The scope will be subject to agreement with relevant bodies.

6.4.24. This assessment will be presented in Chapter 8: Marine Biodiversity (Volume 1) of the ES once further construction information is available.

Construction Road Traffic Noise

6.4.25. An assessment of noise impacts arising from construction vehicles on the surrounding road network has been undertaken based on the principles of LA 111[16]. All road traffic noise predictions have been undertaken based on the principles of the calculation methodology presented in the CRTN[15] and LA 111[16].

6.4.26. An assessment of the potential magnitude of impacts and associated significance of effects has been undertaken of the predicted noise level changes, using guidance set out in LA 111[16]. The short term magnitude of impact scales as defined in LA 111[16] are presented in the following table.

Table 6-5: Magnitude of Impact Scales from LA 111[16]

Magnitude of Impact	Significance	Short term noise change (dB $L_{A10,18hr}$)
Negligible	**Not significant**	Less than 1.0
Minor		1.0 to 2.9
Moderate	Likely to be **significant**	3.0 to 4.9
Major		Greater than or equal to 5.0

6.4.27. LA 111[16] states that the initial assessment of any potential likely significant adverse effects should be based on the short term magnitude of impact scale, and that an impact of 'moderate' or 'major' corresponds to a potential likely significant adverse effect; however, an impact of 'negligible' or 'minor' corresponds to a likely not significant adverse effect.

6.4.28. Following this initial assessment of potential significance, LA 111[16] states that a construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights;
- a total number of days exceeding 40 in any 6 consecutive months.

6.4.29. Given the likely duration of the construction works over a maximum period of 60 months, it is considered that the above time-based criteria would be exceeded therefore any moderate or major impacts would be significant, but any negligible or minor impacts would be not significant. The construction assessment presented in this chapter is appropriate for both construction programme options, as set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1).**

OPERATION PHASE ASSESSMENT METHODOLOGY

Operational Noise – Landside Receptors

6.4.30. Noise resulting from the operation phase of the Proposed Scheme has been assessed in accordance with BS 4142: 2014+A1:2019[13]. The detailed methodology for assessing commercial sources in line with BS 4142: 2014+A1:2019 has been set out in **Appendix 6-3: Supplementary Acoustics Guidance and Policy Information (Volume 3)**.

6.4.31. Using the results of the baseline survey, noise emission targets for the Proposed Scheme have been derived in accordance with BS 4142: 2014+A1:2019 [13], which states that, "*a difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context, and the lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context*".

6.4.32. Consequently, operational noise effects may be considered significant depending on both the margin by which the rating level of the specific sound source exceeds the background sound level and also the context in which the sound occurs. Magnitude of impacts described as moderate or major in Table 6-6 may be considered significant, depending on the context.

Table 6-6: Operation Noise Criteria

Magnitude of Impact	Significance	BS 4142: 2014+A1:2019 Descriptor	Excess of Rating Level Over Background Sound Level
Major	May be considered significant, depending on the context	Indication of a significant adverse impact, depending on the context.	Around +10 dB
Moderate		Indication of an adverse impact, depending on the context.	Around +5 dB
Minor	Not significant	Not defined in BS 4142: 2014+A1:2019	Between 0 and 5 dB
Negligible		Indication of a low impact, depending on the context	≤0

6.4.33. The significance is dependent on both the margin by which the rating level of the specific sound source exceeds the background sound level and also the context in which the sound occurs. Factors taken into consideration for the context may include:

- the absolute sound level at the individual receptor;
- the character and level of the residual sound compared to the character and level of the specific sound; and
- the sensitivity of the receptor and whether dwellings already incorporate noise mitigation measures.

Noise Modelling

6.4.34. A detailed acoustic model of the Proposed Scheme and surrounding area has been produced to calculate the specific noise level at the nearest residential properties and compared against the noise emission targets based on design information available to date.

6.4.35. The model has been produced using CadnaA® noise mapping software[22] and the modelled site layout is based upon the evolving design.

6.4.36. The base mapping has been established using Ordnance Survey open data and the topography across the area surrounding the site has been based on 1m Digital Terrain Model (DTM) data.

6.4.37. The following assumptions have been adopted in the acoustic model:

- Ground absorption has been set at 1 for the majority of the model extent to approximate the predominantly acoustically absorbent ground cover between the noise sources and the facades of the proposed residential properties. Areas with significant levels of hard ground have been modelled with a ground absorption of 0. The order of reflections is set within the model at 2.
- The heights of existing buildings located near to the Proposed Scheme have been approximated individually using online mapping software.
- Heights of the proposed residential properties have been determined using online mapping software.
- Noise levels have been predicted at the facades of the residential properties on Clydesdale Way at a height of 7m above ground level for the first floor apartments and increasing by 3m for each subsequent floor.

6.4.38. The assessment assumptions and sources of information for each item of plant have been identified in **Appendix 6-4 Operational Noise Modelling (Volume 3)**.

Operational Noise – Marine Receptors

6.4.39. An underwater noise and vibration assessment will be provided in Chapter 8: Marine Biodiversity (Volume 1) of the ES to determine whether the resultant noise and vibration levels during operational maintenance dredging are predicted to exceed the tolerant thresholds for marine species and if so, to determine the scope of any further required assessments. The scope will be subject to agreement with relevant bodies.

6.4.40. This assessment will be presented in Chapter 8: Marine Biodiversity (Volume 1) of the ES once further construction information is available.

SIGNIFICANCE CRITERIA

6.4.41. The matrix for determining significant effects for both the construction and operation phases is in **Section 4.10** of **Chapter 4: EIA Methodology (Volume 1)** and sets out the defined descriptors for magnitude of impact (degree of change) and sensitivity of the receptor.

6.4.42. For this technical chapter, all sensitive receptors are considered to have a high sensitivity.

6.5. STUDY AREA

6.5.1. The Study Areas are as follows:

- Construction Phase:
  - Construction Noise (landside and marine receptors) – 300m radius from the Site Boundary, in line with the guidance in LA 111[16]; and
  - Construction Road Traffic – 600m radius from the Site Boundary, based on professional experience.
- Operational Phase:
  - Operation Noise (landside and marine receptors) – 600m radius from the Site Boundary, in line with the guidance in LA 111[16].

6.5.2. The selected receptors for the assessments are also representative of neighbouring properties in their vicinity. By choosing a selection of the closest, identified, potentially sensitive receptors the reported impacts are, consequently, typical of the worst affected receptors and all potentially significant effects are identified. At receptors further away from the works the impact would be reduced.

6.6. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

6.6.1. A summary of the results obtained from the continuous noise measurements is presented in Table 6-7 below. The locations of these measurement positions has been provided in **Figure 6-1: Noise Survey Monitoring Locations (Volume 2)**.

Table 6-7: Summary of Noise Monitoring Data

Measurement Position	Daytime Noise Level (07:00 – 23:00) $L_{Aeq, 16hr}$ (dB)	Daytime Noise Level (07:00 – 19:00) $L_{Aeq, 12hr}$ (dB)	Night-time Noise Level (23:00 – 07:00) $L_{Aeq, 8hr}$ (dB)	Typical Daytime Background Sound Level (07:00 – 23:00), $L_{A90, 15\ mins}$ (dB)	Typical Night-time Background Sound Level (23:00 – 07:00), $L_{A90, 15\ mins}$ (dB)
MP1	60	61	55	54	49
MP2	62	63	56	58	46
MP3	57	59	51	50	49

6.6.2. The ambient noise levels have been derived for the typical 16-hour day (07:00 – 23:00), 12-hour construction weekday (07:00 – 19:00) and 8-hour night (23:00 – 07:00). The latter two periods have been used to inform the construction noise assessment, and the former to provide context for the operation noise assessment.

6.6.3. Histograms showing the frequency of occurrence of background sound levels at each measurement position are presented in Figures 2 to 7 in **Appendix 6-2 Noise Monitoring (Volume 3)**. These have been used to determine the typical background sound level, based on the most commonly occurring measured $L_{A90,\ 15\ mins}$ value. Table 6-7 presents the typical background sound level obtained from studying both the daytime and night-time periods across the entire measurement duration. These background sound levels were then used to inform the operational noise assessment.

FUTURE BASELINE

6.6.4. The future baseline noise climate at the nearest sensitive receptors may be influenced by changes in road traffic noise or due to the industrial and commercial uses in the area. Whilst the potential for future development in the area could give rise to higher ambient noise levels, there is unlikely to be a significant change to the background sound levels. Furthermore, any future developments would only give rise to an increase in noise levels, and therefore the use of existing noise levels is considered to be a conservative approach.

6.6.5. The future baseline noise climate may also be influenced by the operation of Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken). The ES for Riverside 2[23] concluded that there would be no significant noise effects at the nearest receptors, either from development-generated traffic or from operation of Riverside 2. The operational impact of Riverside 2 was 5 dB below the background sound level, and therefore would not alter the ambient noise level at the nearest sensitive receptors to the Proposed Scheme. Consequently, no significant changes to the baseline noise climate at the nearby sensitive receptors are anticipated in the future as a result of Riverside 2. Furthermore, it is anticipated that the Proposed Scheme will act as a barrier to noise from Riverside 2 on the noise sensitive receptors. On this basis, adopting the existing ambient noise environment as the baseline is considered to represent a reasonable worst-case scenario.

6.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

6.7.1. This section sets out the embedded design, mitigation and enhancement measures relevant to the noise and vibration assessment.

CONSTRUCTION PHASE

6.7.2. The adoption of Best Practicable Means (BPM), as defined in the Control of Pollution Act 1974[10], will be a fundamental embedded mitigation measure. The manifestation of BPM will be a series of noise and vibration control measures that will be incorporated within the OCoCP. Compliance with the OCoCP, to be submitted with the DCO application, will result in noise and vibration impacts during construction being avoided or reduced.

6.7.3. The most relevant measures demonstrating BPM with respect to noise and vibration are set out below:

- Noisy works only being undertaken within agreed construction working hours, which are expected to be Monday to Friday 07:00 to 19:00, Saturdays 07:00 to 13:00, with no works on Sundays or Bank Holidays with the exception of the marine construction activities which are expected to be 24 hours and 7 days a week.
- Display the name and contact details for a nominated site contact for the public on the Site to deal with complaints and engaging with local residents.
- Selection of quiet and low noise/vibration equipment and methodologies, where practicable.
- Optimal location of acoustic screening to minimise adverse noise effects.
- Optimal location of equipment onsite to minimise noise/vibration disturbance.
- The provision of acoustic enclosures around static plant, where necessary.

OPERATION PHASE

6.7.4. No embedded design, mitigation or enhancement measures are proposed for noise and vibration at this stage. Mitigation measures will be reviewed and embedded within the design as appropriate for the ES.

6.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

6.8.1. This section details the preliminary assessment of impacts and effects for the Proposed Scheme during both the construction phase and operation phase, taking into account the embedded design, mitigation and enhancement measures detailed in **Section 6.7** (where relevant).

6.8.2. The choice between demolition or retention of the Belvedere Power Station Jetty (disused) will not change the outcomes of the preliminary assessment of impacts and effects reported within this technical chapter. If the Belvedere Power Station Jetty (disused) is retained, it is anticipated that fewer impacts would result; although this will be assessed and confirmed in the ES.

CONSTRUCTION PHASE

Construction Noise (Landside Receptors)

6.8.3. Typical construction phase noise levels have been predicted for each key stage of work at the nearest sensitive receptors, which are taken to be as follows:

- C1 – Residential properties on Clydesdale Way;
- C2 – Residential properties on North Road;
- C3 – Residential properties on Little Brights Road;
- C4 - Travellers' site located off Jenningtree Way; and
- C5 – Travelodge London Belvedere, Clydesdale Way.

6.8.4. Any sensitive receptors located further away than those identified above, including those on Norman Road[a] and Poppy Close, should experience lower noise levels (and by association impacts and effects) based on professional judgement.

6.8.5. The receptors identified for the construction noise assessment are shown on **Figure 6-2: Construction Noise – Sensitive Receptors (Volume 2).**

6.8.6. For the purposes of assessment, the principal construction activities have been considered and divided into the following key activities:

- Proposed Jetty:
  - Belvedere Power Station Jetty (disused) demolition and Proposed Jetty construction.
- Proposed Scheme:
  - site clearance and enabling works; and
  - substructure and superstructure works.
- Ancillary Infrastructure:
  - excavation; and
  - pavement works.

6.8.7. The key activities align with the preliminary construction programmes presented in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

6.8.8. A schedule of construction plant has been collated by professional experience and experience of similar schemes. **Appendix 6-5: Construction Noise and Vibration (Volume 3)** provides the plant and machinery assumed for the construction noise assessment. This includes the items, quantities and assumed utilisation rates used in the prediction of noise levels during each of the key activities.

6.8.9. For all phases, the predicted façade noise levels are based on the following assumptions:

- noise propagation is hemispherical;
- the intervening ground between the construction noise source and the relevant noise sensitive property is reflective in the acoustic sense;
- there is no attenuation from atmospheric absorption;
- the predicted noise levels are those under neutral weather conditions;
- the majority of data sourced from BS 5228:2009+A1:2014-1[12] as a single figure value, with a few exceptions; and
- all plant has been set with a source height of 1.5m.

[a] Located approximately 200m south of the Site Boundary.

6.8.10. It is necessary to determine which BS 5228:2009+A1:2014-1[12] ABC category is relevant to each sample receptor. The baseline noise measurements have been used to provide the ambient noise levels at each receptor location. The appropriate ABC method assessment category (and therefore the SOAEL) for each location has been determined from the measured free-field ambient noise level, corrected to the façade via the addition of 3dB. Table 6-8 identifies the process used to determine the ABC category at each receptor location. Further information and detail on BS 5228 and the ABC method is presented in **Appendix 6-3: Supplementary Acoustics Guidance and Policy Information (Volume 3)**.

Table 6-8: Determination of ABC Category at Each Receptor

Receptor	Ambient Noise Level $L_{Aeq,T}$ (dB) Façade		Rounded to the Nearest 5 dB		ABC Category	
	Day	Night	Day	Night	Day	Night
C1 - Clydesdale Way	64	58	65	60	B	C
C2 - North Road	64	58	65	60	B	C
C3 – Little Brights Road	64	58	65	60	B	C
C4 - Travellers' Site located off Jenningtree Way	64	58	65	60	B	C
C5 - Travelodge London Belvedere Hotel	64	58	65	60	B	C
Note: MP1 is the closest measurement position to the receptors assessed, and therefore most representative of the noise climate at these locations.						

6.8.11. The calculated worst-case noise levels associated with the demolition and construction works are presented in **Table 6-9,** together with the magnitude of impact based on the significance scale presented in **Table 6-4**, as per the relevant ABC category.

Table 6-9: Predicted Construction Noise Levels and Magnitude of Impact

Receptor	Construction Activity	Daytime		Night-time	
		Predicted $L_{Aeq,12h}$ dB Façade	Magnitude of impact	Predicted $L_{Aeq,8h}$ dB Façade	Magnitude of impact
C1 - Clydesdale Way	Demolition of Belvedere Power Station Jetty (disused)	49	**Negligible**	49	**Negligible**
	Earthworks and Proposed Jetty construction	54	**Negligible**	54	**Minor**
	Site clearance and enabling works	63	**Negligible**	n/a	n/a
	Substructure and superstructure	68	**Minor**	n/a	n/a
	Excavation	58	**Negligible**	n/a	n/a
	Pavement works	63	**Negligible**	n/a	n/a
C2 - North Road	Demolition of Belvedere Power Station Jetty (disused)	48	**Negligible**	48	**Negligible**
	Earthworks and Proposed Jetty construction	52	**Negligible**	52	**Minor**
	Site clearance and enabling works	58	**Negligible**	n/a	n/a
	Substructure and superstructure	63	**Negligible**	n/a	n/a
	Excavation	51	**Negligible**	n/a	n/a
	Pavement works	56	**Negligible**	n/a	n/a
C3 – Little Brights Road	Demolition of Belvedere Power Station Jetty (disused)	49	**Negligible**	49	**Negligible**
	Earthworks and Proposed Jetty construction	53	**Negligible**	53	**Minor**

Receptor	Construction Activity	Daytime		Night-time	
		Predicted $L_{Aeq,12h}$ dB Façade	Magnitude of impact	Predicted $L_{Aeq,8h}$ dB Façade	Magnitude of impact
	Site clearance and enabling works	59	**Negligible**	n/a	n/a
	Substructure and superstructure	65	**Minor**	n/a	n/a
	Excavation	54	**Negligible**	n/a	n/a
	Pavement works	59	**Negligible**	n/a	n/a
C4 - Travellers' site located off Jenningtree Way	Demolition of Belvedere Power Station Jetty (disused)	49	**Negligible**	49	**Negligible**
	Earthworks and Proposed Jetty construction	54	**Negligible**	54	**Minor**
	Site clearance and enabling works	52	**Negligible**	n/a	n/a
	Substructure and superstructure	58	**Negligible**	n/a	n/a
	Excavation	47	**Negligible**	n/a	n/a
	Pavement works	51	**Negligible**	n/a	n/a
C5- Travelodge London Belvedere hotel	Demolition of Belvedere Power Station Jetty (disused)	49	**Negligible**	49	**Negligible**
	Earthworks and Proposed Jetty construction	54	**Negligible**	54	**Minor**
	Site clearance and enabling works	63	**Negligible**	n/a	n/a
	Substructure and superstructure	68	**Minor**	n/a	n/a
	Excavation	59	**Negligible**	n/a	n/a
	Pavement works	63	**Negligible**	n/a	n/a
Note: Night-time works only for the Belvedere Power Station Jetty (disused) demolition and Proposed Jetty construction.					

6.8.12. The preliminary assessment generally anticipates impacts of negligible magnitude. This is to be expected given the separation distance between the Proposed Scheme and the nearest noise sensitive receptors is sizeable in most cases.

6.8.13. An impact of minor magnitude is anticipated at some receptors during the day and night, for certain activities. However, the predictions are likely to be an over-estimate, as it is unlikely that all plant would be occurring simultaneously at the closest boundary to the receptors, and no account has been taken from screening by neighbouring buildings. It is likely that plant and activities would be more spread out, both in terms of activity and geographical location of plant within that activity.

6.8.14. Overall, the construction noise is likely to have a direct, temporary, short term **minor adverse (not significant)** effect on the landside receptors.

Construction Road Traffic Noise

6.8.15. In addition to construction plant operating on the Site, there will be movement of materials to and from the Site by road. The construction phase of the Proposed Scheme has a forecast a maximum number of 288 HGV deliveries per day (576 two-way movements).

6.8.16. **Table 6-10** presents 18-hour Annual Average Weekday Traffic (AAWT) flow data for the key road links in the vicinity of the Site, with and without the peak construction traffic, together with the predicted change in noise level. The change in noise level has been compared with the magnitude of impact scale, as set out in **Table 6-5**, and the resulting magnitude of impact reported.

Table 6-10: Predicted Change in Noise Level from Construction Traffic

Road Link	AAWT – Baseline	% HGV	AAWT – Peak Construction Year	%HGV	Predicted Noise Level Change	Magnitude of Impact
Yarnton Way	21747	21%	22606	22%	0.3 dB	Negligible
A2016 Picardy Manorway	10422	19%	10537	19%	0.0 dB	Negligible
A2016 Bronze Age Way	29761	22%	29974	23%	0.1 dB	Negligible
A2016 Eastern Way	24385	29%	24927	28%	0.0 dB	Negligible

6.8.17. The preliminary assessment results indicate that with construction vehicles on the surrounding road network, the increase in noise levels are likely to have a direct, temporary, short term **negligible (not significant)** effect.

OPERATION PHASE

Operational Noise – Landside Receptors

6.8.18. The assessment to determine the potential likely significant effects for noise associated with the operation phase are set out below.

6.8.19. The background sound level has been determined at Travelodge London Belvedere and the residential receptors at Clydesdale Way from the data captured at MP1 as identified previously in **Table 6-7**.

6.8.20. The specific sound level has been determined using the CadnaA[22] noise model identified above. It has been assumed that all plant would be running constantly for the entire assessment period during both the daytime and night-time as a worst-case.

6.8.21. An acoustic feature correction of +3dB has been applied based on the assumption the cooling fans at the water heating plant will have a tonal component. This is considered to be a precautionary approach as full, one-third octave band data for the plant is not available at this time.

6.8.22. **Table 6-11** presents the BS4142 assessment that has been carried out for operational noise from the Proposed Scheme at the receptor at Clydesdale Way.

Table 6-11: Operational Noise Impact Assessment – Clydesdale Way

Time Period	Background sound level $L_{A90, T}$ dB	Specific sound level at nearest noise sensitive receptor $L_{Aeq\ T}$ dB	Acoustic feature correction	Rating sound level	Excess of rating sound level over background sound level
Daytime	54	50	+3	53	-1
Night-time	49	50	+3	53	+4

6.8.23. As per the magnitude of impact matrix in **Table 6-6**, the initial estimate of impact would indicate a negligible magnitude of change during the daytime and a minor magnitude of change during the night-time. However, this is prior to considering the context of the noise generated by the Proposed Scheme within the surrounding existing noise climate. In summary, the operational noise is likely to have a direct, permanent, long term **minor adverse (not significant)** effect during the daytime and a **minor adverse (not significant)** effect during the night-time.

6.8.24. **Table 6-12** identifies the BS4142 assessment that has been carried out for operational noise from the Proposed Scheme at the receptor at Travelodge London Belvedere.

Table 6-12: Operational Noise Impact Assessment – Travelodge London Belvedere

Time Period	Background Sound Level $L_{A90, T}$ dB	Specific Sound Level at Nearest Noise Sensitive Receptor $L_{Aeq\ T}$ dB	Acoustic Feature Correction	Rating Sound Level	Excess of Rating Sound Level over Background Sound Level
Daytime	54	51	+3	54	0
Night-time	49	51	+3	54	+5

6.8.25. As per the magnitude of impact matrix in **Table 6-6**, the initial estimate of impact would indicate a negligible magnitude of change during the daytime and a moderate magnitude of change during the night-time. However, this is prior to considering the context of the noise generated by the scheme within the surrounding existing noise climate. In summary, the operational noise is likely to have a direct, permanent, long term **negligible (not significant)** effect during the daytime and a **moderate adverse (significant)** effect during the night-time.

6.8.26. For context, a noise impact assessment should consider all pertinent contextual factors before modifying the initial impact estimation accordingly. In this case the key contextual considerations are considered to be:

- **Frequency of exposure:** The air source heat pump (ASHP) fans associated with the water heating facility of the Proposed Scheme are the greatest source of noise at both sensitive receptors. The ASHP will be in use when thermal capacity cannot be provided by Riverside 1 or Riverside 2. The ASHP will be active for approximately 1,500 hours per year, which is approximately 17% of the time. This would support a downward modification to any estimated impact magnitude.
- **The established use of the Site:** The Proposed Scheme will be located within an existing large commercial/industrial area and therefore will not be out of character with the existing noise climate. This would support a downward modification to any estimated impact magnitude.
- **The sensitivity of the receptor**: The exposed facades of the residential development on Clydesdale Way and the Travelodge London Belvedere are orientated towards a busy A-road (A2016 Picardy Manorway) and consequently are designed with acoustic façade mitigation to minimise any potential noise impact, including air conditioning in the Travelodge London Belvedere. As such, the sensitivity of those receptors should be considered lower supporting a downward modification of the initial impact estimation.

- **The character of the residual sound compared to the character of the specific sound**: The characteristics of the sound, being industrial in nature, are similar to that of the prevailing noise environment which is dominated by existing industrial/commercial noise and road traffic noise.
- **The level of the residual sound compared to the level of the specific sound**: The level of the ambient sound (60 dB $L_{Aeq,16h}$ during the day and 55 dB $L_{Aeq,8h}$ during the night), is higher than the predicted specific sound level (51 dB $L_{Aeq,T}$) at the receptors on Clydesdale Way and the Travelodge London Belvedere. The above two factors (character and level of the residual sound) support a downward modification to any estimated impact magnitude.

6.8.27. Considering the above contextual factors, it is considered that the impact during the night-time can be reduced to a direct, permanent, long term **minor adverse (not significant)** effect.

Noise from Emergency Pressure Release Valves

6.8.28. There are emergency pressure relief valves associated with the onsite LCO_2 temporary storage. These valves will release LCO_2 should pressure within the temporary storage become too great to avoid damage to the Proposed Scheme. As the valves will only be used in emergency situations, and are not considered part of typical activities, they have not been included within the main assessment.

6.8.29. An assessment of noise from the pressure relief valve impacting closest to the sensitive receptors has been undertaken, and the specific noise level has been predicted to be 45 dB $L_{Aeq,T}$. Assuming a partially open window reduces the external noise level by 15 dB, the internal noise level would not exceed the L_{Aeq} or L_{max} night-time noise criteria identified within BS 8233[18]. Therefore, the noise from the emergency use of the pressure relief valves is considered to have a direct, permanent, long term **negligible impact (not significant)**.

Uncertainty

6.8.30. Uncertainties in all aspects of this operational noise assessment have been minimised as far as possible and their consideration is set out in more detail in **Appendix 6-6: Uncertainty Matrix (Volume 3)**.

6.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

6.9.1. This section sets out the additional mitigation and compensation measures that are relevant for noise and vibration.

CONSTRUCTION PHASE

Construction Noise

6.9.2. No further additional design, mitigation or enhancement measures than those identified in **Section 6.7** are proposed for noise and vibration.

OPERATION PHASE

6.9.3. Given the ASHP fans of the Proposed Scheme are the greatest source of noise at Clydesdale Way, consideration will be given to selecting the quietest plant available and/or located plant as far as possible away from the nearest sensitive receptors. The selection of plant will be reviewed and updated in Chapter 6: Noise and Vibration (Volume 1) of the ES.

6.10. MONITORING

6.10.1. No monitoring of noise and vibration effects is considered to be proportionate or to be required. This will be reviewed and updated as required for the ES.

6.11. RESIDUAL EFFECTS

6.11.1. **Table 6-13** summarises the residual effects associated with the Proposed Scheme.

Table 6-13: Noise and Vibration Summary of Residual Effects

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Construction Phase				
Construction Noise (landside receptors)	C1 - Clydesdale Way	**Minor (not significant)**	N/A	**Minor (not significant)**
	C2 - North Road	**Minor (not significant)**	N/A	**Minor (not significant)**
	C3 - Little Brights Road	**Minor (not significant)**	N/A	**Minor (not significant)**
	C4 - Travellers' site located off Jenningtree Way	**Minor (not significant)**	N/A	**Minor (not significant)**
	C5 - Travelodge London Belvedere hotel	**Minor (not significant)**	N/A	**Minor (not significant)**
Construction Road Traffic Noise	N/A	**Negligible (not significant)**	None required.	**Negligible (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Operation Phase				
Operational Noise (landside receptors)	C1 - Clydesdale Way	**Minor Adverse (not significant)**	Selecting quietest ASHP fans and locating plant as far as practicable away from sensitive receptors.	**Minor Adverse (not significant)**
	C5- Travelodge London Belvedere hotel	**Moderate Adverse (significant)**		**Minor Adverse (not significant)**

6.12. NEXT STEPS

6.12.1. Further work to be completed and included in the ES comprises:

- A construction and operational underwater noise and vibration assessment will be undertaken to understand the potential effects on ecological receptors (which will be reported in Chapter 8: Marine Biodiversity (Volume 1) of the ES).
- The choice between demolition or retention of the Belvedere Power Station Jetty (disused) will not change the outcomes of the preliminary assessment of impacts and effects reported within this technical chapter. If the Belvedere Power Station Jetty (disused) is retained, it is anticipated that fewer impacts would result for marine receptors; although this will be assessed and confirmed in the ES.
- The detailed assessment within the ES will involve a review of the noise and vibration assessment presented in this technical chapter, based on further information as part of ongoing design development.
- Given the ASHP fans of the Proposed Scheme are the greatest source of noise at Clydesdale Way, consideration will be given to selecting the quietest plant available and/or located plant as far as practicable away from the nearest sensitive receptors. The location of the plant will be assessed within Chapter 6: Noise and Vibration (Volume 1) of the ES.

6.13. LIMITATIONS AND ASSUMPTIONS

6.13.1. The following limitations and assumptions have been identified:

- At the time of undertaking this preliminary assessment detailed information regarding construction activities and construction plant are not available. Calculations have been based on an indicative construction schedule.
- Table A-6-16 in **Appendix 6-4: Operational Noise Modelling (Volume 3)** identifies assumptions that have been made for each noise source identified within the Proposed Scheme.

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DECARBONISATION

CHAPTER 7: TERRESTRIAL BIODIVERSITY

Cory Decarbonisation Project

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TABLE

7. TERRESTRIAL BIODIVERSITY

7.1. INTRODUCTION

7.1.1. This chapter reports the preliminary assessment of the likely potential significant effects of the Proposed Scheme on terrestrial biodiversity during construction and operation and describes:

- relevant policy, legislation and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operational phase.

7.1.2. This preliminary assessment covers ecological features found within the land-side areas of the Site, including the freshwater habitats (i.e., drainage ditches) and fish species associated with them. However, where appropriate, it also assesses effects that can cross this boundary such as potential effects on wintering birds and the River Thames-side features resulting from surface water run-off. It does not duplicate information contained in the marine biodiversity assessment set out in **Chapter 8: Marine Biodiversity (Volume 1)**.

7.2. POLICY, LEGISLATION, AND GUIDANCE

7.2.1. The policy, legislation, and guidance relevant to the assessment of terrestrial biodiversity for the Proposed Scheme is detailed in **Table 7-1**.

Table 7-1: Terrestrial Biodiversity Summary of Key Policy, Legislation, and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011[1]	Sets out the Government's policy for delivery of major energy infrastructure and is currently the primary basis for decision making of applications within the Planning Act 2008 regime. NPS EN-1 contains the following policy statements of key relevance for the purpose of the assessment of environmental impacts on ecological features: • The SoS must *"consider whether the project may have a significant effect on a European Site, or any site to which the same protection"* must be made under the Conservation of Habitats and Species Regulations 2017 (Paragraph 4.3.1).

Policy, Legislation or Guidance	Description
	• *"As a general principle, and subject to the specific policies below, development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives …where significant harm cannot be avoided, then appropriate compensation measures should be sought"* (Paragraph 5.3.7). • *"The most important sites for biodiversity are those identified through international conventions and European Directives. The Habitats Regulations provide statutory protection for these sites but do not provide statutory protection for potential Special Protection Areas (pSPAs) before they have been classified as a Special Protection Area. For the purposes of considering development proposals affecting them, as a matter of policy the Government wishes pSPAs to be considered in the same way as if they had already been classified. Listed Ramsar sites should, also as a matter of policy, receive the same protection"* (Paragraph 5.3.9). • *"Where a proposed development on land within or outside an SSSI is likely to have an adverse effect on an SSSI (either individually or in combination with other developments), development consent should not normally be granted. Where an adverse effect, after mitigation, on the site's notified special interest features is likely, an exception should only be made where the benefits (including need) 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 5.3.11). • *"Sites of regional and local biodiversity and geological interest, which include Regionally Important Geological Sites, Local Nature Reserves and Local Sites, have a fundamental role to play in meeting overall national biodiversity targets; contributing to the quality of life and the well-being of the community; and in supporting research and education"* (Paragraph 5.3.13).

Policy, Legislation or Guidance	Description
	• "*Ancient woodland is a valuable biodiversity resource both for its diversity of species and for its longevity as woodland... Aged or 'veteran' trees found outside ancient woodland are also particularly valuable for biodiversity and their loss should be avoided*" (Paragraph 5.3.14). • "*Other species and habitats have been identified as being of principal importance for the conservation of biodiversity in England and Wales and thereby requiring conservation action…these species and habitats are protected from the adverse effects of development by using requirements of planning obligations*" (Paragraph 5.3.17).
Draft Overarching National Policy Statement (NPS) for Energy EN-1 2023[2]	This Draft Overarching National Policy Statement for Energy (EN-1) is part of a suite of draft NPSs issued by the Secretary of State of DESNZ. It sets out the government's policy for delivery of major energy infrastructure and will likely replace the 2011 NPSs by the time the application for the Proposed Scheme is submitted. EN-1 updates the existing Policy Statement with the addition of the principles of Biodiversity Net Gain, alongside existing commitments to the protection of wildlife through avoidance of effects on designated sites, ancient woodland, veteran trees, and a commitment to avoidance and/or minimising effects rather than just mitigating for them. The following paragraphs relate to terrestrial biodiversity: • *"Biodiversity net gain is an essential component of environmental net gain. Projects in England should consider and seek to incorporate improvements in natural capital, ecosystem services and the benefits they deliver when planning how to deliver biodiversity net gain"* (Paragraph 4.5.2). • *"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 or enhancing other ecosystem service outcomes. Reference should be made to relevant national or local plans and strategies, to inform off-site biodiversity net gain delivery. If published, the relevant*

Policy, Legislation or Guidance	Description
	strategy is the Local Nature Recovery Strategy (LNRS). If an LNRS has not been published, the relevant consenting body or planning authority may specify alternative plans, policies or strategies to use" (Paragraph 4.5.10). • *"Although achieving biodiversity net gain is not currently an obligation on applicants, Schedule 15 of the Environment Act 2021 contains provisions which, when commenced, mean the SoS may not grant an application for Development Consent Order unless satisfied that a biodiversity gain objective is met in relation to the onshore development in England to which the application relates"* (Paragraph 4.5.17). • *"The government's policy for biodiversity in England … aim[s] … to halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people. This aim needs to be viewed in the context of the challenge presented by climate change. Healthy, naturally functioning ecosystems and coherent ecological networks will be more resilient and adaptable to climate change effects. Failure to address this challenge will result in significant adverse impact on biodiversity and the ecosystem services it provides"* (Paragraph 5.4.2). • *"The highest level of biodiversity protection is afforded to sites identified through international conventions. The Habitats Regulations set out sites for which an HRA will assess the implications of a plan or project, including Special Areas of Conservation and Special Protection Areas."* (Paragraph 5.4.4). • *"As a matter of policy, the following should be given the same protection as sites covered by the Habitats Regulations and an HRA will also be required:* – potential Special Protection Areas and possible Special Areas of Conservation; – listed or proposed Ramsar sites; and – sites identified, or required, as compensatory measures for adverse effects on any of the other sites covered by this paragraph" (Paragraph 5.4.5).

Policy, Legislation or Guidance	Description
	• *"…development should, in line with the mitigation hierarchy, aim to avoid significant harm to biodiversity and geological conservation interests, including through consideration of reasonable alternatives (as set out in Section 4.2 above). Where significant harm cannot be avoided, impacts should be mitigated and as a last resort, appropriate compensation measures should be sought"* (Paragraph 5.4.42). • *"The Secretary of State should give due consideration to such regional or local designations. However, given the need for new nationally significant infrastructure, these designations should not be used in themselves to refuse development consent. Development will still be expected to comply with the biodiversity and geological conservation requirements set out in this NPS"* (Paragraph 5.4.43). • *"The Secretary of State should not grant development consent for any development that would result in the loss or deterioration of any irreplaceable habitats, including ancient woodland, and ancient or veteran trees unless there are wholly exceptional reasons, and a suitable compensation strategy exists"* (Paragraph 5.4.54).
National Planning Policy Framework (NPPF) 2023[3]	The NPPF sets out the Government's planning policies for England and how these should be applied, with the following paragraphs relating to terrestrial biodiversity: • Section 15, paragraph 174(d) states that the planning system should contribute to and enhance the natural and local environment by: "*minimising impacts on biodiversity and providing net gains in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures*"; and • Section 15, paragraph 180 states that: "*When determining planning applications, local planning authorities should apply the following principles: if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused*". It also states that: "*development resulting in the loss or*

Policy, Legislation or Guidance	Description
	deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused should be refused, unless there are wholly exceptional reasons[a] *and a suitable compensation strategy exists*".
The London Plan 2021[4]	The Spatial Development Strategy for Greater London setting out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policies GG2 and GG3 establish the principles of growth within Greater London. Policy G1, Policy G6 and Policy G7 are the key policies specific to terrestrial biodiversity within Greater London. These policies state that: • Policy GG2: Making the best use of land – states in item F that development should "*protect and enhance London's open spaces, including the Green Belt, Metropolitan Open Land, designated nature conservation sites and local spaces, and promote the creation of new green infrastructure and urban greening, including aiming to secure net biodiversity gains where possible*". • Policy GG3: Creating a healthy city – states in item G that development should "*plan for improved access to and quality of green spaces, the provision of new green infrastructure, and spaces for play, recreation and sports*". • Policy G1: Green Infrastructure – *"…Green infrastructure should be planned, designed and managed in an integrated way to achieve multiple benefits. Boroughs should prepare green infrastructure strategies that identify opportunities for cross-borough collaboration, ensure green infrastructure is optimised and consider green infrastructure in an integrated way as part of a network"*.

[a] For example, infrastructure projects (including nationally significant infrastructure projects, orders under the Transport and Works Act and hybrid bills), where the public benefit would clearly outweigh the loss or deterioration of habitat.

Policy, Legislation or Guidance	Description
	• Policy G6: Biodiversity and Access to Nature – "*Boroughs, in developing Development Plans should seek opportunities to create other habitats, or features such as artificial nest sites, that are of particular relevance and benefit in an urban context*". • Policy G7: Trees and woodlands – "*In their Development Plans, boroughs should:* – protect 'veteran' trees and ancient woodland where these are not already part of a protected site. – identify opportunities for tree planting in strategic locations".
The Bexley Local Plan 2023[5]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development across the Borough. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. It addresses terrestrial biodiversity through the following policies: • SP8: Green infrastructure including designated Green Belt – *"Bexley's green infrastructure, including open spaces and waterways will be protected, enhanced, restored and promoted as valuable resources to provide a healthy integrated network for the benefit of nature, people and the economy. Future development must support the delivery of a high-quality, well-connected and sustainable network of open spaces";* • SP9: Protecting and Enhancing Biodiversity and Geological Assets – paragraph 5.102 states that "*this strategic policy seeks to ensure that the quantity of Bexley's biodiversity is protected and enhanced, including avoiding adverse impacts from development on species and sites of nature conservation value*"; and • DP20: Biodiversity and Geodiversity in Developments – which presents the matters that proposed development must consider, including the mitigation hierarchy, biodiversity net gain, enhancement measures and opportunities to connect and improve the wider ecological networks, and wildlife corridors. It also states that "*development proposals that would have a direct or indirect impact on a site designated for its nature conservation or geological interest should protect and enhance the designated site's value, and*

Policy, Legislation or Guidance	Description
	will not be permitted unless all of the following criteria are met: – there are no reasonable, less damaging, alternative solutions, locations or sites; – ecological buffer zones have been incorporated into the scheme, where appropriate, to protect and enhance the designated site's intrinsic value; – the continuity of wildlife habitat within wildlife corridors is maintained; and – access to the designated site is not compromised and where possible, access and/or interpretation is improved".
London Environment Strategy 2018[6]	The London Environment Strategy and its appendices include aims relevant to terrestrial biodiversity. By 2050, through green infrastructure the strategy states that "*London will be the world's first National Park City, where more than half of its area is green, where the natural environment is protected, and where the network of green infrastructure is managed to benefit all Londoners*". Greener outcomes under the strategy will be that "*All Londoners should be able to enjoy the very best parks, trees and wildlife. Creating a greener city is good for everyone – it will improve people's health and quality of life, support the success of businesses and attract more visitors to London*". It states these aims would be achieved through one of four strategic approaches, specifically that of "*green infrastructure and natural capital accounting*". Policies relevant to terrestrial biodiversity comprise: • Policy 5.1.1 – "*Protect, enhance and increase green areas in the city, to provide green infrastructure services and benefits that London needs now and in the future*". Whose relevant constituent policy proposals relevant to terrestrial biodiversity comprise: – *"Proposal 5.1.1.a The London Plan includes policies that protect the Green Belt, Metropolitan Open Land, and the public green space network of parks and open spaces;* – *Proposal 5.1.1.b The London Plan includes policies that ensure any development outside the*

Policy, Legislation or Guidance	Description
	protected green space network, including gardens, does not lead to an overall loss of green cover; and – *Proposal 5.1.1.d The London Plan includes policies to green streets and buildings, including increasing the extent of green roofs, green walls and sustainable drainage".* • Policy 5.2.1 – "*Protect a core network of nature conservation sites and ensure a net gain in biodiversity*". Whose relevant constituent policy proposals relevant to terrestrial biodiversity comprise: – *"Proposal 5.2.1.a The London Plan includes policies on the protection of Sites of Importance for Nature Conservation (SINCs) and Regionally Important Geological Sites (RIGS);* – *Proposal 5.2.1.b The Mayor will develop a biodiversity net gain approach for London, and promote wildlife-friendly landscaping in new developments and regeneration projects; and* – *Proposal 5.2.1.c The Mayor will provide guidance and support on the management and creation of priority habitats, the conservation of priority species, and the establishment of wildlife corridors".*
The UK Post-2010 Biodiversity Framework 2012[7]	The UK Post-2010 Biodiversity Framework covers the period from 2011 to 2020 and was developed in response to two main drivers: the Convention on Biological Diversity's Strategic Plan for Biodiversity 2011-2020[8], and its five strategic goals; and 20 'Aichi Targets'. The Biodiversity Framework shows how the work of the four UK countries joins up with work at a UK level to achieve the 'Aichi Targets' and the aims of the EU Biodiversity Strategy. It identifies the activities required to complement each country's biodiversity strategy, and where work in the country strategy contributes to international obligations.
A Green Future: Our 25 Year Plan to Improve the Environment 2018[9]	Released in 2018, the UK Government's environment plan sets out goals for improving the environment within a 25-year timeframe. It details how the government will work with communities and businesses to achieve the goals, which include several of relevance to biodiversity including that wildlife and plants should thrive, resources

Policy, Legislation or Guidance	Description
	from nature should be used more sustainably and efficiently, there should be mitigation and adaptation to climate change and that biosecurity should be enhanced.
Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services 2011[10]	Biodiversity 2020 provides a comprehensive picture of how international and EU commitments are implemented in England and sets out the strategic direction for biodiversity policy for the next decade on land (including rivers and lakes) and at sea.
Bexley Biodiversity Action Plan (BAP) 2011[11]	The Bexley BAP aims to achieve targets relevant to the Royal Borough of Bexley identified in both the UK and London BAP. The action plan lists a number of habitats and species (including marine/estuarine habitat and species) within Bexley for which targets have been set to increase their range and distribution.
South East Inshore Marine Plan 2021[12]	The South East Inshore Marine Plan area stretches from Felixstowe in Suffolk to west of Dover in Kent and incorporates the River Thames. The South East Inshore Marine Plan will help to enhance conserve and restore biodiversity through applying well-established principles of biodiversity gain and delivery of a well-managed, ecologically coherent network of marine protected areas, specific policies for biodiversity include: • Policy SE-BIO-1; • Policy SE-BIO-2; and • Policy SE-BIO-3.
The Thames River Basin District Action Management Plan 2022[13]	The Thames River Basin District (RBD) River Basin Management Plan describes the challenges that threaten the water environment and how these challenges can be managed.
Legislation	
Environment Act 2021[14]	The Environment Act 2021 makes provision for targets, plans and policies for improving the environment. Section 98 of the Environment Act specifies that measures outlined in Schedule 14 of the Environment Act, to make provision for biodiversity gain to be a condition of planning permission in England, are to apply. Schedule 14 specifies that biodiversity gains are to be assessed using the metric published by the SoS and a 10% gain will be mandatory. The Act includes this requirement for NSIPs, being secured under Section 99 and Schedule 15

Policy, Legislation or Guidance	Description
	of the Planning Act 2008. It is expected that the mandatory requirement for a 10% gain will come into force in November 2025 through the provision of biodiversity gain statements or updates to the NPS. A BNG assessment for the Proposed Scheme will be submitted as part of the application for development consent, notwithstanding that the statutory provisions for BNG are not yet in force.
The Wildlife and Countryside Act 1981 (as amended) (WCA)[15]	The primary legislation for the protection of animals, plants and habitats in the UK. This legislation covers three main areas: • Wildlife protection, including protection of wild birds, their eggs and nests, protection of other animal and protection of plants; • Nature Conservation, Countryside and National Parks; and • Public Rights of Way (PRoW).
Countryside and Rights of Way (CROW) Act 2000[16]	Part III of this Act gives greater protection to wildlife and natural features by making provision for the conservation of biological diversity, by improving protection for Sites of Special Scientific Interest (SSSIs) in England and Wales and the enforcement of wildlife legislation.
The Natural Environment and Rural Communities (NERC) Act 2006[17]	The NERC Act was designed to help achieve a rich and diverse natural environment and thriving rural communities through modernised and simplified arrangements for delivering Government policy. The NERC Act established a new independent body (Natural England) responsible for conserving, enhancing, and managing England's natural environment for the benefit of current and future generations, thereby contributing to sustainable development. The NERC Act made amendments to both the Wildlife and Countryside Act 1981 and the CROW Act 2000. Section 40 of the NERC Act imposes a duty on public authorities *"In exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity*". This duty was extended by the Environment Act 2021 to refer also to the enhancement of biodiversity, going beyond the mere maintenance of biodiversity in its current state.

Policy, Legislation or Guidance	Description
	Section 41 of the NERC Act requires the Secretary of State to *"publish a list of the living organisms and types of habitat which in the Secretary of State's opinion are of principal importance for the purpose of conserving biodiversity*". These are referred to as Habitats/Species of Principal Importance.
The Protection of Badgers Act 1992[18]	Under the Protection of Badgers Act it is an offence to wilfully take, kill, injure (or attempt to do so), possess or ill-treat a badger. Under this Act, setts are protected against intentional or reckless interference. Sett interference includes damaging or destroying, obstructing access to any part, or disturbance of a badger whilst it is occupying a sett. The Act defines a badger sett as *"any structure or place, which displays signs indicating the current use by a badger*" and Natural England interprets this definition to include seasonally used setts that are not occupied but that show signs of recent use by badgers.
The Hedgerows Regulations 1997[19]	The Hedgerow Regulations are designed to protect hedgerows in England and Wales and regulate their removal and replacement. They apply to any hedgerow growing in, or adjacent to, any common land, protected land, or land used for agriculture, forestry or the breeding or keeping of horses, ponies or donkeys that have a continuous length of at least 20m, or if less than 20m, meets another hedgerow at each end. A higher level of protection is afforded to *"important"* hedgerows, with a hedgerow being classified as important if it, or the hedgerow of which it is a stretch, has existed for 30 years or more and satisfies other specified criteria provided for by those regulations (cross-reference with Part II of Schedule 1 to The Hedgerow Regulations 1997).
The Wild Mammals (Protection) Act 1996[20]	The Wild Mammals (Protection) Act 1996 makes provision for the protection of wild mammals from certain cruel acts; and for connected purposes. It is an offence for anyone to mutilate, kick, beat, nail (or otherwise impale), stab, burn, stone, crush, drown, drag or asphyxiate any wild mammal with intent to inflict unnecessary suffering.

Policy, Legislation or Guidance	Description
The Conservation of Habitats and Species Regulations 2017 (as amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019) ('the Habitats Regulations') 2017[21]	The Habitats Regulations, which implement the Habitats Directive (EC Directive 92/43/EEC) in the United Kingdom, and in particular Regulation 63, require the competent authority consenting a development to determine whether appropriate assessment is necessary before deciding whether to give consent, permission or other authorisation for plan or project which: • "*is likely to have a significant effect on a European Site (either alone or in combination with other projects)*[b]; *and* • *is not directly connected with or necessary to the management of that site must make an appropriate assessment of the implications of the plan or project for that site in view of that site's conservation objectives"*. In the case of the Proposed Scheme, the competent authority is the SoS. To enable the competent authority to determine whether an appropriate assessment is necessary a person applying for any such consent, permission or other authorisation must provide such information as the competent authority may reasonably require for this purpose. If a plan or project may adversely impact a European Site, Regulation 64 of the Habitats Regulations provides that the competent authority may agree to the plan or project notwithstanding that adverse assessment of the implications for the European Site only where it is satisfied that: • there is no alternative solution to the plan or project to avoid the adverse impact; and • the plan or project must be carried out for imperative reasons of overriding public interest including those of a social or economic nature.

[b] European sites include Special Areas of Conservation (SAC), Special Protection Areas (SPA), Sites of Community Importance (SCI), and candidate SACs. The NPPF states that internationally important wetlands designated under the Ramsar Convention 1971 (Ramsar sites and potential Ramsar sites) are afforded the same protection as SPAs and SACs, for the purpose of considering development proposals that may affect them (and so are considered in this report as "European sites").

Policy, Legislation or Guidance	Description
	Where the site to be adversely impacted hosts a priority natural habitat type[c] or a priority species, the imperative reasons of overriding public interest must be either: • *"reasons relating to human health, public safety or beneficial consequences of primary importance to the environment*; *or* • *any other reasons which the competent authority, having due regard to the opinion of the European Commission, considers to be imperative reasons of overriding public interest*"[d]. In addition, Regulation 55 requires "*Licences for certain activities relating to animals or plants*", namely where activities would lead to adverse effects on species identified by the Habitats Regulations. The Habitat Regulations have created a national site network for both terrestrial biodiversity (this chapter) and marine biodiversity (see **Chapter 8: Marine Biodiversity (Volume 1)**), including both the inshore and offshore marine areas in the UK. This new national site network includes existing Special Areas of Conservation (SACs) and Special Protection Areas (SPAs), and new SACs and SPAs designated under these regulations. Any references to Natura 2000 in the Conservation of Habitats and Species Regulations 2017 now refers to the new national site network.
National Parks and Access to the Countryside Act 1948[22]	The Act provides the framework for the creation of National Parks and the establishment of a National Parks Commission. The Act confers powers on the Nature Conservancy (a now defunct government body whose functions Natural England now perform) and local authorities: for the establishment and maintenance of nature reserves; to make further provision for the recording, creation, maintenance and improvement of public paths; for securing access to open country; and to amend the law relating to PRoW.

[c] See Article 1(d) of EC Directive 92/43/EEC.
[d] See Article 1(h) of EC Directive 92/43/EEC.

Policy, Legislation or Guidance	Description
The Salmon and Freshwater Fisheries Act 1975[23]	This Act addresses the regulation of fisheries in England and Wales, including legislation that covers the introduction of polluting effluents, the obstruction of fish passage (screens, dams, weirs, culverts etc.) illegal means of fishing, permitted times of legal fishing and fishing licencing (which covers electric fishing). Under this Act any person who causes or knowingly permits to flow, or puts or knowingly permits to be put, into any waters containing fish or into any tributaries of waters containing fish, any liquid or solid matter to such an extent as to cause the waters to be poisonous or injurious to fish or the spawning grounds, spawn or food of fish, shall be guilty of an offence. The Act requires that fish passes are installed on new and rebuilt barriers that affect waters frequented by salmon or migratory trout.
The Eels (England and Wales) Regulations 2009[24]	The Eels (England and Wales) Regulations 2009 implement Council Regulation (EC) No 1100/2007 of the Council of the European Union, which required Member States to establish measures for the recovery of the stock of European eel. The regulations apply across England and Wales. The Eels Regulations give powers to the regulators (the Environment Agency and Natural Resources Wales) to implement recovery measures in all freshwater and estuarine waters in England and Wales. The aim of the Regulations is to achieve 40% escapement of adult eels relative to escapement levels under pristine conditions. The measures, as set out in the legislation, by which this is to be achieved are to reduce fishing pressures, improve access and habitat quality and reduce the impact of impingement and entrainment. Under the Regulations, regulators can serve notice to companies detailing their legal obligation to screen intakes and outfalls for eel and/or to remove or modify obstructions to eel migration. However, it is possible for companies to be granted with exemptions if the costs of works greatly exceeds the benefits. In such a situation it is likely the regulator will seek a package of more cost-effective, “alternative measures”.

Policy, Legislation or Guidance	Description
The Water Environment (Water Framework Directive) (England and Wales) Regulations (the 'Water Framework Regulations') 2017[25]	The Water Framework Directive (WFD) (2000/60/EC) establishes a framework for the management and protection of Europe's water resources. It was implemented in England and Wales through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (as amended). The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (as amended) has subsequently been revoked and replaced by the Water Framework Regulations. The purpose of the Water Framework Regulations is to establish a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater. All water bodies (unless artificial or heavily modified) are required to achieve 'good' ecological status unless alternate objectives are set or there are grounds for deterioration. Ecological status demonstrates the quality of the structure and function of surface water ecosystems indicated through 'quality elements'. These include hydromorphological, chemical and biological indicators (including benthic invertebrates, macroalgae, fish, phytoplankton and angiosperms). When considering the effect of a development or activity on a water body, it is a regulatory requirement under the Water Framework Regulations to assess if it will cause or contribute to a deterioration in status or jeopardise the water body achieving good status in the future. The Water Framework Regulations identify Lower and Higher Sensitivity Habitats that are considered important features requiring protection. Where a development is considered to cause deterioration, or where it may contribute to the failure of the water body to meet Good Ecological Status or Good Ecological Potential Status, then an assessment to demonstrate that the development is exempt under Article 4.7. This makes provision for deterioration of status, provided that certain stringent conditions are met. Under the Water Framework Regulations water bodies can become WFD-designated. WFD-designated water bodies each have a status.

Policy, Legislation or Guidance	Description
Guidance	
National Planning Practice Guidance (2021)[26]	Explains the processes and tools that can be used through the planning system in England. In relation to terrestrial biodiversity, guidance on Appropriate Assessment (i.e., the assessment of effects on sites designated under the Conservation of Habitats and Species Regulations 2017) and Environmental Impact Assessment are relevant. The guidance advises how to identify suitable mitigation and adaptation measures in the planning process. This would require the implementation of appropriate measures by the local planning authorities. The guidance particularly recommends development of brownfield sites over greenfield sites, implementation of green infrastructure networks in development, avoidance of effects on important ecological sites and species and use of appropriate mitigation where necessary.
Chartered Institute of Ecology and Environmental Management (CIEEM) Guidance 2017[27]	These pieces of guidance aim to increase the quality of ecological reports supporting development applications by laying down minimum standards for what should be covered by ecologists undertaking such studies, and also defining best practice in baseline ecological reporting.

7.3. SCOPING OPINION AND CONSULTATION

7.3.1. An EIA Scoping Opinion[28] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26th May 2023. The responses from the Planning Inspectorate and relevant stakeholders in relation to terrestrial biodiversity and how these requirements should be addressed by the Applicant are set out in **Table 7-2** below.

Table 7-2: Summary of the EIA Scoping Opinion in relation to Terrestrial Biodiversity

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Planning Inspectorate			
3.3.1	Maintenance activities during operation.	*"The Scoping Report states that species present in the site and immediate surroundings are acclimatised to existing levels of human activity and human activity may increase slightly during operation. The Scoping Report does not provide details regarding the type, duration and location of maintenance activities. It is also considered that as the Proposed Development proposes to use part of the Crossness LNR, there may be species present which are currently able to avoid areas which currently experience human activity. The Proposed Development would encroach onto the LNR and may create disturbance to some species. Therefore, the Inspectorate does not consider this matter can be scoped out of the ES".*	Operation phase disturbance from maintenance activities is considered as a potential significant effect of the Proposed Scheme in the preliminary assessment presented in this technical chapter.
3.3.2	Impacts on Badgers	*"The Scoping Report states that the site does not provide suitable habitat for badger due to the high water table (preventing sett building) and its fragmented, industrialised nature. The Inspectorate agrees with this justification and is content that this matter may be scoped out".*	No response required.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.3.3	Habitat formed of development land, hard standing buildings	*"Paragraph 6.3.13 of the Scoping Opinion outlines the habitat types which have been included within the assessment. In addition to the habitat types listed, the Inspectorate considers that marshland habitat and open water habitat should also be included in the assessment.* *The Inspectorate is otherwise content that the remaining land can be scoped out on the basis that it is comprised of development land, hard standing and buildings which have no ecological value".*	'Marshland' habitat has been included within the preliminary assessment presented in this technical chapter through the following habitat types: Coastal and floodplain grazing marsh; intertidal mudflats and reedbeds. 'Open water' habitat has been included in the scope as both river habitat (within the River Thames) and standing water (within drainage ditches and ponds).
3.3.4	Impacts on Great Crested Newt	*"The Scoping Report states that the Manager of the Crossness LNR (from Thames Water) has confirmed there are no records of great crested newt within the LNR. The Scoping Report also notes that the London Borough of Bexley does not require surveys for great crested newts for planning applications in this location, further suggesting they are absent from both the site and immediate surroundings. Therefore, the Inspectorate agrees to scope this matter out, however evidence of the dialogue with the Thames Water Crossness LNR manager should be included within the ES or supporting appendices".*	Great Crested Newt (GCN) has been scoped out of further assessment. Evidence supporting this position through communications with Thames Water is found in **Appendix 7-1: Consultation with Thames Water (Volume 3)**.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.3.6	Impacts on Otter	*"The Scoping Report states that no records of otter were identified from the desk study. It also considers that the majority of the application site does not provide suitable habitat for otter holts. There is an area of scrub/ woodland in the south of the site which may be suitable to support otter, but given recent developments nearby, and lack of evidence of otter being present, the Inspectorate agrees with the justification provided and agrees to scope this matter out".*	No response required.
3.3.7	Crossness LNR	*"The Thames Water scoping consultation response (Appendix 2 of this Opinion) states that there are inaccuracies in the reporting of bird, invertebrate and macroinvertebrate species at the Crossness LNR as presented in the Scoping Report (for example, it states that 210 bird species have been identified at the LNR, whereas the Scoping Report states 130). The ES should ensure that each assessment is carried out using and presenting an accurate representation of the most recent data available."*	The EIA Scoping Report[29] has been based on data made available by Greenspace Information for Greater London (GiGL), rather than records directly supplied by Thames Water. Biological records have been received from Thames Water for Crossness LNR and have been incorporated into the baseline for this PEIR, updating that provided by the EIA Scoping Report[29].
3.3.8	Freshwater Fish	*"The Scoping Report states that the Environment Agency's Ecology and Fish Data Explorer returned no records of fresh fish from within the site boundary. However, the Environment Agency's scoping consultation response (Appendix 2 of this Opinion) states that*	The ES will assess potential impacts from the Proposed Scheme on freshwater fish, supported by baseline eDNA survey data of ditches and water bodies within the Site

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		monitoring has not taken place for many years. The ES should assess potential impacts on freshwater fish, supported by robust baseline survey data, unless otherwise agreed with relevant consultation bodies."	Boundary, as detailed in the EIA Scoping Report[29] and this technical chapter.
3.3.9	Guidance	*"The Applicant is advised that CIEEM's guidelines for Ecological Impact Assessment (EcIA) was updated in 2019. The Applicant should have regard to the most recent version of the guidelines when undertaking the assessment of ecological impacts. The London Environment Strategy has not been referenced in relation to biodiversity, this document should be referenced within the ES."*	**Table 7-1** above includes reference to both the London Environment Strategy 2018[6] and the updated CIEEM EcIA guidelines.
3.3.10	Mitigation and Compensation	*"The ES should demonstrate how the mitigation measures proposed have followed the mitigation hierarchy. The ES should clearly explain the measures which are considered to be mitigation, and which are compensation measures in respect of any habitat loss from Crossness LNR. The mitigation and compensation package should be progressed with key stakeholders such as Natural England and Thames Water".*	Where residual effects of the Proposed Scheme are identified, appropriate measures will be proposed in the ES following the 'mitigation hierarchy', comprising avoidance measures to remove effects of the Proposed Scheme, mitigation to manage effects of the Proposed Scheme on retained ecological features, and where features cannot be retained compensation for effects both on and off-Site. The DCO application will also explain the design evolution for the Proposed Scheme, to explain where impacts could not be avoided in the context of surrounding

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			constraints, and the nature of the Proposed Scheme meaning that it needs to be located on the Riverside Campus. Compensation (including using off site areas) will only be sought where no other design option is feasible. With respect to Crossness LNR, avoidance of habitat loss has been pursued where practicable, as detailed in **Chapter 3: Consideration of Alternatives (Volume 1)**. Dialogue about habitat loss in Crossness LNR and compensation proposals (within and outside of the Site) for such loss is central to consultation that is underway with a range of stakeholders.
3.3.11	Description of Impacts	*"The ES should assess impacts on the Crossness LNR and the Erith Marshes MSINC from shading as a result of the Proposed Development".*	Shading as a result of the Proposed Scheme has been added as a potential impact within this technical chapter. The assessment of potential effects on Crossness LNR and the Erith Marshes Metropolitan SINC (MSINC), as well as water voles and other ecological features, that may be affected by shading, will be presented within the ES, and will inform design development. The methodology for this assessment is described in **Section 7.4** of this technical chapter.

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3.3.12	Description of Impacts	*"It is unclear from the project description how much new hard standing and impermeable surfaces would be introduced as a result of the Proposed Development. The ES should assess the potential for effects from surface water run off on species which are dependent on certain salinity levels. Cross reference should be made to the Water Environment and Flood Risk chapter of the ES".*	Effects of salinity changes will be considered under the impact of surface water run-off within the ES and have been identified as such in this technical chapter. The assessment will cross reference the assessment presented in **Chapter 11: Water Environment and Flood Risk (Volume 1)**.
3.3.13	Assessment Methodology	*"The Inspectorate considers that Thames Water, as owners of the Crossness LNR, should be kept informed regarding the methodology for ecological surveys together with the results of all survey work undertaken within the Crossness LNR".*	It is confirmed that Thames Water are a consultee for the Proposed Scheme with regards ecological surveys and the results of them (as confirmed by consultation, see **Table 7-3**).
3.3.14	Ecological Surveys	*"There appears to be a discrepancy between the zone of influence (ZoI) for effects from the Proposed Development which are set out in Table 6-3 and the extent of the ecological surveys. The detail in Table 6-3 states for many of the species, the Proposed Development may create effects within the site boundary and 25 metres beyond. However, the majority of the surveys listed in paragraph 6.8.2 of the Scoping Report only include land within the site boundary. The ES should clearly explain the reasoning for the spatial extents of the surveys undertaken, recognising the mobility of species which may use both land within and outside of the site*	It is confirmed that Study Areas, particularly those used for ecological surveys, are sufficient to address consideration of impacts on all species likely to be affected by the Proposed Scheme. Survey data collected from within the Site will be sufficient to inform the assessment of effects that may extend outside it a short distance (approximately 25m) through extrapolation, reasoning and consideration of ecological records. Thus, the Zone of Influence (ZOI) and survey extents are appropriate for the scale of the Proposed

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		boundary. The description of baseline conditions and assessment in the ES should be sufficient to address impacts on all species likely to be affected by the Proposed Development".	Scheme. The ES will explain the reasoning for the spatial extents of the surveys undertaken, which recognise the mobility of species that may use both land within and outside of the Site.
3.3.15	Reptile Surveys	*"The Scoping Report states that reptile surveys will be undertaken during September and October 2023. Reptile surveys are typically undertaken on several visits between March and October. The ES should explain how many surveys were undertaken and why it is considered that surveying in this short time period would provide a robust level of results to inform the assessment".*	Reptile surveys use artificial refugia to attract reptiles, which use them to warm their bodies so they may become mobile for foraging and other activities. However, best practice is that such surveys avoid summer months when artificial refugia are either not used due to high environmental temperatures or used only briefly as they heat up quickly. For this reason, surveys have been planned for late summer and early autumn when environmental temperatures are relatively low and most effective at attracting reptiles[30]. Visits will be conducted throughout this period.
3.3.16	European eel surveys and water supply	*"Paragraph 6.3.36 of the Scoping Report states that "it can be assumed that European eel may be present within the site". The Scoping Report identifies a number of ditches on and around the site and explains that surveys will be undertaken in these ditches for water voles and aquatic macroinvertebrates and macrophytes. The ES*	Although European eel breed in saltwater, the transboundary nature of their ecology means they inhabit both marine and freshwater environments[31]. European eel has therefore been covered in both **Chapter 7: Terrestrial Biodiversity (Volume 1)** (for their freshwater

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		should confirm that surveys of the ditches have been undertaken for European eels which may use this habitat or justify why these are not required, in agreement with relevant consultees. The Applicant should consider the use of an Eel Recovery Plan. The ES should confirm where the water supply required for the Proposed Development will be derived from. If water from the Thames River will be used, then additional components may be required such as fine mesh and low velocity intake screening in order to prevent adverse effects to fish including European eels."	phase) and **Chapter 8: Marine Biodiversity (Volume 1)** (for their migratory/marine phase). The points raised by the Planning Inspectorate's response 3.3.16 will be covered in both technical chapters. **Chapter 2: Site and Proposed Scheme Description (Volume 1)** describes the water supply required for the Proposed Scheme. This will not involve abstraction from the River Thames.
3.3.17	Confidential Annexes	*"Public bodies have a responsibility to avoid releasing environmental information that could bring about harm to sensitive or vulnerable ecological features. Specific survey and assessment data relating to the presence and locations of species such as badgers, rare birds and plants that could be subject to disturbance, damage, persecution, or commercial exploitation resulting from publication of the information, should be provided in the ES as a confidential annex. All other assessment information should be included in an ES chapter, as normal, with a placeholder explaining that a confidential annex has been submitted to the Inspectorate and may be made available subject to request".*	This PEIR and the subsequent ES will comply with the highlighted responsibilities with respect to confidential information on species. Badgers have been scoped out of the assessment.

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Environment Agency			
N/A	Ecology (Fisheries)	*"Limited records are available for freshwater fish species in the Great Breach system. Historically it was known to support Tench, Rudd, crucian carp and some eels, however, there has been no monitoring for many years and the extent of these fish populations is no longer known. Survey by e- DNA will give an indication of the species now present, but if the project plans entail any major changes to channels or watercourses, then physical fish surveys may be required to assess risk to fish populations."*	Fish surveys, using the e-DNA technique, are proposed and will inform the assessment.
		"The plans entail the demolition of the existing derelict Belvedere Power Station Jetty. such redundant jetty structures can have an important ecological function in terms of a high tide roosting/refuge area for many important species of overwintering wading birds. These jetties, that are free from terrestrial predators and disturbance, provide a valuable roost that wading birds can retreat to and rest over the high tide periods when the intertidal mud is covered. Given its current lack of use, and the presence of the two isolated mooring dolphins, then this jetty may well be an important roosting structure. This will need to be accounted for in the PEIR	Consideration of impacts of demolition of the Belvedere Power Station Jetty (disused) are included in the scope of the assessment. Wintering bird surveys have been undertaken and will provide baseline data for this assessment. In addition, data from terrestrial invasive non-native plant species survey will inform the assessment. The choice between demolition or retention of the Belvedere Power Station Jetty (disused) will not change the outcomes of the preliminary assessment of impacts and effects reported within this technical chapter,

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		and consideration given to suitable mitigation if it is found to be important. *Additionally, the underwater structure and replacement of should be assessed for its current contribution (or not) to biodiversity and the proposal should aim to ensure a betterment for ecological niches and fish refuge to help fulfil biodiversity net gain. The jetty is used by wintering birds should be picked up by the proposed surveys. Identification of terrestrial and marine INNS required with mitigation measures."*	due to the fact that the preliminary assessment within this technical chapter is limited to the land-side areas within the Site. The demolition or retention of the Belvedere Power Station Jetty (disused) is further considered within **Chapter 8: Marine Biodiversity (Volume 1).** A detailed assessment will be undertaken and presented in Chapter 8: Marine Biodiversity (Volume 1) of the ES.
London Borough of Bexley			
N/A	Terrestrial Biodiversity	*"The Sites of Importance for Nature Conservation (SINC) network ensures that the majority of the most important habitats and species are protected through the land use planning process. Consequently, SINCs receive a significant degree of protection through the planning process (London Environment Strategy and LES Appendix 2). The London Environment Strategy has not been referenced in relation to biodiversity and should be included."*	SINC have been included in the assessment. **Table 7-1** includes reference to the London Environment Strategy[6] and its appendices.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
N/A	Terrestrial Biodiversity	*"The application site boundary includes areas designated for their significant ecological importance, for example, the Crossness Nature Reserve and several Metropolitan and borough sites of importance for nature conservation and strategic green wildlife corridors. Any potentially negative impacts on these designations will need careful consideration. London Plan Policy G6 and GG2 along with Local Plan Policies SP8, SP9 and DP20 are the main planning policies providing planning protection for these designated sites. Policy GG3 has not been listed in table 6-1 and should be included."*	SINC have been included in the assessment. Cited policies have been included and referenced in **Table 7-1**, including relevant parts of London Plan[4], notably Policy GG2 and GG3.
N/A	Terrestrial Biodiversity	*"References to Sites of Importance for Nature Conservation (SINC) should reflect their strategic significance. For example, table 6-2 refers to the River Thames and Tidal Tributaries MSINC and the Erith Marshes MSINC. These are both Metropolitan SINC (MSINC) designations, reflecting that they are highly significance sites, not just to the borough, but also to the whole of London. The term metropolitan should be included when referencing these SINC.* *Ref 2.4 refers to the Addendum to the SINC Report 2016, however, the 2016 report is only partially replaced by the addendum, and so both reports should be referred to https://www.bexley.gov.uk/services/planning-and-building-control/planning-policy-and-*	Strategic significance, and the overall importance of SINC, has been considered in the evaluation of these ecological features. We have attached M (to indicate Metropolitan grade) to the SINC designations for River Thames and Tidal Tributaries MSINC and Erith Marshes MSINC. References have been updated to show the 2016 SINC Report.

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		guidance/biodiversity-and-geodiversity The published Bexley Green Infrastructure Study also provides background evidence on green infrastructure in the borough including both open space and biodiversity, and supports the implementation of the Local Plan."	
N/A	Terrestrial Biodiversity	*"Ecological surveys should be undertaken at the most appropriate optimum times of year. Paragraph 6.8.2. of the Scoping Opinion refers to further surveys planned for 2023 and states that 'Reptile surveys will be undertaken from September to October 2023'. Generally, reptiles are active from March to October. However, the best time to survey is a mixture of time of year, time of day and weather conditions, with peak months being April and May, when reptiles are most visible. Several survey visits are typically required; therefore, it is recommended surveys are carried out across the survey season, including peak months, to provide the most accurate picture of the reptile population."*	Reptile surveys use artificial refugia to attract reptiles, which use them to warm their bodies so they may become mobile for foraging and other activities. However, best practice is that such surveys avoid summer months when artificial refugia are either not used due to high environmental temperatures or used only briefly as they heat up quickly. For this reason, surveys have been planned for late summer and early autumn when environmental temperatures are relatively low and most effective at attracting reptiles[26]. Visits will be conducted throughout this period.
N/A	Terrestrial Biodiversity	*"Table 6-4 of the Scoping Opinion scopes out maintenance activities during the operational phase. However, it is unclear to the Council at this stage if access to ecologically sensitive areas will be needed for maintenance to take place, such access may have the*	Operation phase disturbance from maintenance activities is considered as a potential significant effect of the Proposed Scheme in the preliminary assessment presented in this technical chapter.

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		potential for negative impacts such as disturbance to nesting birds."	
N/A	Terrestrial Biodiversity	*"It is noted that enhancement measures to improve the environment, will be included. Local Plan Policy DP20 requires development to demonstrate measurable Biodiversity net gain (BNG) will be achieved. It is therefore recommended that the applicant commits to a minimum 10% BNG. Any ecological enhancement proposed should demonstrate additionality after taking into account enhancement and BNG commitments agreed through already approved planning consents."*	BNG assessment for the Proposed Scheme will be submitted as part of the application for development consent. This will consider existing habitats forming baseline conditions within the Site and quantify their biodiversity value using Defra's Biodiversity Metric (the most current version at the time of writing being 4.0[32]). Post-development habitat creation and enhancement will be a feature of the Proposed Scheme to achieve the 10% BNG standard. This gain for biodiversity will be over and above those already secured in existing planning consents, ensuring 10% net gain will be achieved as a result of the Proposed Scheme alone, and thus will demonstrate additionality.
Natural England			
N/A	Biodiversity and Geodiversity	*"The assessment will need to include potential impacts of the proposal upon sites and features of nature conservation interest as well as opportunities for nature recovery through biodiversity net gain (BNG). There might also be strategic approaches to take into account.*	The assessment will include sites and features of nature conservation interest as well as consideration of Biodiversity Net Gain through a companion assessment. The

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		Ecological Impact Assessment (EcIA) is the process of identifying, quantifying, and evaluating the potential impacts of defined actions on ecosystems or their components. EcIA may be carried out as part of the EIA process or to support other forms of environmental assessment or appraisal. Guidelines have been developed by the Chartered Institute of Ecology and Environmental Management (CIEEM)."	assessment of impacts will use CIEEM guidelines.
N/A	Designated Nature Conservation Sites: International and European Sites	*"The ES should thoroughly assess the potential for the proposal to affect internationally designated sites of nature conservation importance / European sites, including marine sites where relevant. This includes Special Protection Areas (SPA), Special Areas of Conservation (SAC), listed Ramsar sites, candidate SAC and proposed SPA.* *Article 6 (3) of the Habitats Directive requires an appropriate assessment where a plan or project is likely to have a significant effect upon a European Site, either individually or in combination with other plans or projects."*	The ES will assess the Proposed Scheme for effects on internationally designated sites of nature conservation importance / European sites, including SPAs, SACs, listed Ramsar sites, candidate SAC and proposed SPA. Marine sites will be considered by **Chapter 8: Marine Biodiversity (Volume 1)**. To accompany the ES, a Habitats Regulations Assessment is being undertaken, with the screening stage assessment provided as **Appendix 7-2: Information to Inform a Habitat Regulations Assessment: Stage 1 – Screening (Volume 3)** which has been engaged upon with National England.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
N/A	Designated Nature Conservation Sites: Sites of Special Scientific Interest	*"The Environmental Statement should include a full assessment of the direct and indirect effects of the development on the features of special interest within the SSSIs outlined in the scoping report and identify appropriate mitigation measures to avoid, minimise or reduce any adverse significant effects."*	Potential effects on SSSIs have been included within the scope of the assessment for this technical chapter.
N/A	Designated Nature Conservation Sites: Regionally and Locally Important Sites	*"The ES should consider any impacts upon local wildlife and geological sites, including local nature reserves. Local Sites are identified by the local wildlife trust, geoconservation group or other local group. The ES should set out proposals for mitigation of any impacts and if appropriate, compensation measures and opportunities for enhancement and improving connectivity with wider ecological networks. They may also provide opportunities for delivering beneficial environmental outcomes."*	Potential effects on LNR and SINC have been included within the scope of the assessment for this technical chapter, and highlight the requirements for mitigation and, where necessary, compensation for such effects. The ES will provide detailed proposals for mitigation and compensation, including habitat creation and enhancement. Geological sites are not within the scope of this Terrestrial Biodiversity chapter. They will be assessed in **Chapter 17: Ground Conditions and Soils (Volume 1)** of the ES.
N/A	Protected Species	*"The conservation of species protected under the Wildlife and Countryside Act 1981 and the Conservation of Habitats and Species Regulations 2017 is explained in Part IV and Annex A of Government Circular 06/2005 Biodiversity and Geological Conservation: Statutory Obligations and their Impact within the Planning System.*	These details are noted and have informed our approach to surveys and the assessment. It is likely that the requirement for protected species mitigation licences from Natural England will be limited to water voles but is subject to confirmation from completion of

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		Applicants should check to see if a mitigation licence is required using NE guidance on licencing NE wildlife licences. Applicants can also make use of Natural England's (NE) charged service Pre Submission Screening Service for a review of a draft wildlife licence application. NE then reviews a full draft licence application to issue a Letter of No Impediment (LONI) which explains that based on the information reviewed to date, that it sees no impediment to a licence being granted in the future should the DCO be issued. This is done to give the Planning Inspectorate confidence to make a recommendation to the relevant Secretary of State in granting a DCO. See Advice Note Eleven, Annex C – Natural England and the Planning Inspectorate | National Infrastructure Planning For details of the LONI process. *The ES should assess the impact of all phases of the proposal on protected species (including, for example, great crested newts, reptiles, birds, water voles, badgers and bats). Natural England does not hold comprehensive information regarding the locations of species protected by law. Records of protected species should be obtained from appropriate local biological record centres, nature conservation organisations and local groups. Consideration should be given to the wider context of the*	surveys. Any licence applications will include species specific mitigation and monitoring measures as part of the licence application, and it is our intention to secure Letters of No Impediment from Natural England for them. Geological sites are not within the scope of the Terrestrial Biodiversity chapter. They will be assessed in **Chapter 17: Ground Conditions and Soils (Volume 1)** of the ES.

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		site, for example in terms of habitat linkages and protected species populations in the wider area. *The area likely to be affected by the development should be thoroughly surveyed by competent ecologists at appropriate times of year for relevant species and the survey results, impact assessments and appropriate accompanying mitigation strategies included as part of the ES. Surveys should always be carried out in optimal survey time periods and to current guidance by suitably qualified and, where necessary, licensed, consultants.* *Natural England has adopted standing advice for protected species, which includes guidance on survey and mitigation measures. A separate protected species licence from Natural England or Defra may also be required."*	
N/A	Priority Habitats and Species	*"Priority Habitats and Species are of particular importance for nature conservation and included in the England Biodiversity List published under section 41 of the Natural Environment and Rural Communities Act 2006. Most priority habitats will be mapped either as Sites of Special Scientific Interest, on the Magic website or as Local Wildlife Sites. Lists of priority habitats and species can be found here. Natural England does not routinely hold species data. Such data should be*	These details are noted; it is confirmed that they have informed our approach to survey and assessment.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		collected when impacts on priority habitats or species are considered likely. *Consideration should also be given to the potential environmental value of brownfield sites, often found in urban areas and former industrial land. Sites can be checked against the (draft) national Open Mosaic Habitat (OMH) inventory published by Natural England and freely available to download. Further information is also available here.* *An appropriate level habitat survey should be carried out on the site, to identify any important habitats present. In addition, ornithological, botanical, and invertebrate surveys should be carried out at appropriate times in the year, to establish whether any scarce or priority species are present.* *The Environmental Statement should include details of:* • *Any historical data for the site affected by the proposal (e.g., from previous surveys)* • *Additional surveys carried out as part of this proposal* • *The habitats and species present;* • *The status of these habitats and species (e.g., whether priority species or habitat);* • *The direct and indirect effects of the development upon those habitats and species*	

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		• *Full details of any mitigation or compensation measures* • *Opportunities for biodiversity net gain or other environmental enhancement"*	
N/A	Priority Habitats and Species	*"The Environment Act 2021 includes NSIPs in the requirement for Net Gain but NSIPs will not have to comply with BNG until 2025. Natural England encourages the consideration of BNG as part of the development proposals.* *The ES should use an appropriate biodiversity metric such as Biodiversity Metric 3.0 together with ecological advice to calculate the change in biodiversity resulting from proposed development and demonstrate how proposals can achieve a net gain.* *The metric should be used to:* • *assess or audit the biodiversity unit value of land within the application area* • *calculate the losses and gains in biodiversity unit value resulting from proposed development* • *demonstrate that the required percentage biodiversity net gain will be achieved* *Biodiversity Net Gain outcomes can be achieved on-site, off-site or through a combination of both. On-site provision should be considered first. Delivery should*	A BNG assessment for the Proposed Scheme will be submitted as part of the application for development consent, using the most current metric (currently Version 4.0).

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		create or enhance habitats of equal or higher value. When delivering net gain, opportunities should be sought to link delivery to relevant plans or strategies e.g., Green Infrastructure Strategies or Local Nature Recovery Strategies."	
Thames Water			
N/A	Inclusion of Thames Water Land	*"As a preliminary comment, we would note that the Proposed Development site boundary includes land owned by Thames Water associated with Crossness Sewage Treatment Works and which forms part of the Thames Water Crossness Nature Reserve.* *While there has been initial contact by Cory with Thames Water about the inclusion of Thames Water's land within the Proposed Development site boundary, no formal agreement has been given by Thames Water to use this land. Cory has also not provided any detailed Proposed Development plans for the Thames Water land to date, although an illustrative site layout plan has been shown at meetings which shows significant development utilising the Thames Water land.* *The development of Thames Water land shown within the Proposed Development site boundary would involve:* • *loss of 5.7 acres of Crossness Nature Reserve habitat (East Paddock 4.5 acres; Stable Paddock 1.2 acres).*	These points are noted. All ecological features mentioned in the response will be covered within this technical chapter, its figures and as part of the ES.

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		The Crossness Nature Reserve was required to be provided by a S106 legal agreement associated with the Sludge Powered Generator planning permission dated 21/01/1994 on Crossness Sewage Treatment Works. The S106 agreement also sets out that the Crossness Nature reserve should be maintained as such for at least 99 years; • *potential loss of 756 metres of ditch habitat containing Water Voles, as well as an important invertebrate fauna;* • *loss of Dittander along East Paddock's south ditch – a scarce coastal plant;* • *loss of the part of the Crossness Nature Reserve that is favoured by passage migrant bird species Wheatear, Whinchat, and Stonechat;* • *loss of stables that were paid for with public money. The stable block (located in Stable Paddock) was delivered via the London Borough of Bexley's 'Belvedere Green Links' regeneration programme and funded by the Homes and Communities Agency, European Regional Development Fund and the London Development Agency.* • *loss of part of the Thames Water access road that runs out to Norman Road and bisects the Cory Fields. This*	

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		is an access to the Crossness Nature Reserve, but also a secondary/emergency access to Crossness Sewage Treatment Works. Crossness is Thames Water's second largest sewage treatment works and is of strategic importance to London's infrastructure. *Whilst discussions are ongoing with Cory in relation to the inclusion of Thames Water land within the site boundary and what development may take place on it, Thames Water's position in this respect is fully reserved, to the extent that such land is proposed to be included as part of the Proposed Development the Environmental Statement will need to fully assess the above effects."*	
N/A	Light Impacts	*"Light impacts have been scoped out (see 3.10.1) and yet nocturnal protected species are present at Crossness Nature Reserve in the form of foraging bats (European Protected Species) and by the presence of breeding Barn Owls (a Schedule 1 bird species) – both are species that are at risk of light pollution.* *Light impacts should therefore not be scoped out of the ES and will need to be assessed as part of Cory's Environmental Impact Assessment."*	It is confirmed that the effects of lighting on terrestrial biodiversity have not been scoped out of the assessment. They are included for both the construction and operation phases.

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N/A	Excluded Habitat data	• Fig.6.1 'Habitats of Principal Importance' excludes Thames Water's Sea Wall Field and *Protected Area North, thereby excluding a further 7.3 acres / 3ha of habitat. This habitat is located outside the red line area but adjoins it and is located within the 250m study area. The rest of the Crossness Nature Reserve is marked as Coastal and Floodplain Grazing Marsh on Fig.6.1; the Sea Wall Field and Protected Area North areas should have the same classification.* • 6.3.13 Other Habitats – As well as the marshland habitat missing as above, it is considered *that other areas of open water habitat is missing such as Great Breach Lagoon and Island Field Lagoons and these should also be included."*	These points are noted and will be considered within the ES.
N/A	Section 6.3	*It is understood that the below ecological issues in Section 6.3 will be addressed as the EIA/scheme develops, but it will be important to use the most up to date data.* *By way of update the following information is available from Crossness Nature Reserve:* • *it states in Table 6-2 that 130 bird species have been recorded, but 210 bird species have been recorded at Crossness Nature Reserve*	These points are noted. The Applicant has continued to liaise with Thames Water and obtained data holdings for Crossness LNR. This data will be used to inform the ES, with records received discussed in relevant species survey reports as a desk study resource. A summary of the consultation undertaken to date is provided in **Table 7-3**.

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		• *6.3.31 states that there are 23 notable Terrestrial Invertebrates. From Crossness Nature Reserve data there are 56 nationally scarce terrestrial invertebrates on the reserve, 5 Nationally Rare/Red Data Book, 5 Biodiversity Action Plan, and 3 species that do not have conservation status but that are uncommon in Britain. So, there are 69 notable terrestrial invertebrates within their project area* • *6.3.38 refers to Environment Agency data of 2013 which makes reference to only to 3 non-native species, and no protected macroinvertebrate species. A 2019 Aquatic Invertebrate survey report, states that Crossness Nature Reserve has 99 species of aquatic Coleoptera (beetles) and Heteroptera (true bugs) in its ditches, of which 3 are Red Data Book Species (Nationally Rare) and 14 are Nationally Scarce.* • *Some old data is being used, i.e., reference in 6.3.18 to 'closest record of a bat was a Noctule in 2014'. There are far more up-to-date bat records available which we can make available.* • *6.3.28 Reptile Surveys – states that 2 Common Lizard were recorded during the reptile survey in 2022. Crossness Nature Reserve was a receptor for over 1000 reptiles (Slow Worm and Common Lizard) a few years ago, and we frequently stumble across Slow*	

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		Worm and Grass Snake on site so there is believed to be a healthy population • *6.3.36 states no records of fish, only Eels. As demonstrated by herons, egrets and kingfishers fishing in Crossness Nature Reserve's water bodies, fish are present and further surveys would therefore be required.*	

7.3.2. **Table 7-3** provides a summary of the consultations and engagement undertaken to inform the terrestrial biodiversity assessment to date.

Table 7-3: Terrestrial Biodiversity Consultation and Engagement Summary

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
17th February 2023, Email	Thames Water	Confirmation that GCN are not present at Crossness LNR (see **Appendix 7-1: Consultation with Thames Water (Volume 3)**).
12th April 2023, Meeting	Friends of Crossness Nature Reserve	Initial introductory consultation meeting to present the Proposed Scheme and the approach to consulting with the Friends of Crossness Nature Reserve about the design development of the Proposed Scheme.
19th June 2023, Email	Natural England	Request for opening a dialogue with respect to the Proposed Scheme. A HRA Screening Report was provided for comment (presented as **Appendix 7-2: Information to Inform a Habitat Regulations Report: Stage 1 – Screening (Volume 3)**).
4th July 2023, Email	Thames Water	Provision of biological records, ecological survey reports and quarterly wildlife reports for Crossness LNR.
13th September 2023, Meeting	Friends of Crossness Nature Reserve	Presentation of the Proposed Scheme in its current form including identified mitigation requirements and opportunities. Q&A and consideration of setting up a working group to progress design elements.
14th September 2023, Meeting	LBB	Tour of Riverside 1. Presentation and discussion of the Proposed Scheme in its current form including identified mitigation requirements.
22nd September 2023, Meeting	Natural England	Initial introductory consultation meeting to present the Proposed Scheme and decide next steps in the consultation process and assign roles. Natural England to provide a response on the HRA Screening Report following this meeting.

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
29th September 2023, Email	Natural England	HRA Screening Response from Natural England received (presented as **Appendix 7-3: Information to Inform a Habitat Regulations Report: Stage 1 – Screening, Natural England Response (Volume 3))** and confirmed agreement with the approach set out in the HRA Screening Report (presented as **Appendix 7-2: Information to Inform a Habitat Regulations Report: Stage 1 – Screening (Volume 3)**).

7.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

7.4.1. The terrestrial biodiversity assessment of the Proposed Scheme has been undertaken in line with the legislation, policy and guidance described in **Section 7.2**.

POTENTIALLY SIGNIFICANT EFFECTS

7.4.2. As identified in the EIA Scoping Report[2929], the following effects are considered to be significant and have been considered further in this assessment:

- Construction Phase:
  - habitat loss and fragmentation;
  - noise and vibration;
  - dust;
  - surface water run-off;
  - lighting;
  - changes in air quality; and
  - shading.
- Operation Phase:
  - noise and vibration;
  - maintenance activities;
  - surface water run-off;
  - lighting;
  - changes in air quality; and
  - shading.

MATTERS SCOPED OUT

7.4.3. There are no matters that have been scoped out of further assessment.

SENSITIVE RECEPTORS

7.4.4. The following likely sensitive receptors have been identified within the Study Areas identified in **Section 7.5**.

Designated Sites

Statutory Designated Sites

- Epping Forest SAC;
- Inner Thames Marshes SSSI;
- Ingrebourne Marshes SSSI;
- Oxleas Woodlands SSSI;
- Ruxley Gravel Pits SSSI; and
- West Thurrock Lagoon and Marshes SSSI.

Non Statutory Designated Sites

- Crossness LNR;
- Rainham Marshes LNR;
- Lesnes Abbey Woods LNR;
- Erith Marshes MSINC;
- Belvedere Dykes SINC;
- River Thames and Tidal Tributaries MSINC; and
- 18 further SINCs outside of the Site Boundary.

Habitats

Habitats of Principal Importance (HPI)

- Deciduous Woodland (lowland mixed deciduous woodland);
- Coastal and floodplain grazing marsh;
- Intertidal mudflats; and
- Coastal saltmarsh (adjacent to the Site Boundary).

Other Terrestrial Habitats

- Modified grassland;
- Other neutral grassland;
- Artificial unvegetated unsealed surface;
- Mixed scrub; and
- Open mosaic habitat.

Aquatic habitats

- River habitat;
- Standing water; and
- Reedbeds.

Protected/Notable Species

- Bats;
- Breeding birds;
- Notable plants and invasive species;
- Reptiles;
- Terrestrial invertebrates;
- Water vole;
- Wintering birds;
- Freshwater fish (including European eel);
- Aquatic macroinvertebrates; and
- Macrophytes.

BASELINE DATA COLLECTION

7.4.5. Ecological survey work is underway, with wintering bird surveys undertaken between November 2022 and March 2023, and further surveys throughout spring and summer 2023. Survey work will conclude in autumn 2023. The findings of these surveys will be reported in the ES. To date, only complete data from wintering bird surveys has been available to inform this PEIR above and beyond the desk data.

7.4.6. The surveys that are being undertaken are described in **Table 7-4** below.

Table 7-4: Details of Ecological Surveys Undertaken

Survey	Dates	Scope and Method Detail
Bats	May to September 2023	Bat activity surveys (static monitoring equipment) to provide a comprehensive dataset for bat activity and to identify important commuting and foraging resources within the Site; and Survey of the Site has confirmed there are no trees, buildings or other structures that could support roosting bats present. No further bat survey work focussing on roosting sites will therefore be undertaken.
Breeding birds	March to June 2023	To identify species of bird breeding within the Site.
Notable Plant and Invasive Species	July 2023	Survey specifically for invasive non-native species (INNS) was undertaken within the Site, supported by observation made during other ecological surveys, with surveyors made aware to report INNS.

Survey	Dates	Scope and Method Detail
		National Vegetation Classification (NVC) survey was undertaken to classify the habitat types and their importance within the Site. This included the East and Stable Paddocks, identified as coastal and floodplain grazing marsh HPI, and land within Crossness LNR that falls in the southeastern part of the Site that previously could only be assessed from a PRoW.
Reptiles	September to October 2023	Survey for reptiles will be undertaken within areas of suitable habitat within the Site. This timing has been chosen as it is optimal for reptile survey, avoiding warm summer months when the use of artificial refugia attract reptiles is not effective[30].
Terrestrial Invertebrates	August 2023	Terrestrial invertebrate survey was undertaken to understand the potential for the Site to support rare or notable invertebrates or an invertebrate assemblage of significance/importance[30].
Water Vole	May 2023 to September	Surveys covered all ditches and watercourses within the Site to identify the presence and distribution of water voles.
Wintering Birds	November 2022 to March 2023	To identify species of bird wintering using land within the Site, and the adjacent areas of the River Thames.
Freshwater Fish (including European eel)	June 2023	Fish e-DNA samples were collected from the freshwater watercourses identified within the Site. The e-DNA samples have been sent for analysis. This analysis is suitable for the detection of European eel in its freshwater phase.
Aquatic Macroinvertebrates and Macrophytes	June 2023	Survey used the following methods: • Kick sampling and sweep sampling within the freshwater watercourses identified in the Site. Samples have been processed in the laboratory and data is being analysed to identify any protected or invasive species and describe the community.

Survey	Dates	Scope and Method Detail
		• Pond Predictive System for Multimetrics (PSYM) survey to assess the conservation value of macroinvertebrates inhabiting Pond 7 (described in **Chapter 11: Water Environment (Volume 1)**). Data has been sent for analysis. • Due to access restrictions, only limited macrophyte survey of the ditch system could be undertaken. • Macrophyte survey of Pond 7 was undertaken as part of the PSYM survey.

7.4.7. Survey reports will be presented as technical appendices to the ES.

ASSESSMENT METHODOLOGY

7.4.8. The EIA will be prepared in line with current good practice from CIEEM's Guidelines for Ecological Impact Assessment[33], in addition to the specific methodology detailed in **Chapter 4: EIA Methodology (Volume 1)**. Each receptor will be evaluated within the geographic scale of reference and potential effects during the construction and operation phases of the Proposed Scheme.

7.4.9. Based on the likely effects set out above, the scope of the assessment will include the following:

- determine the importance of ecological features affected, through survey and/or research;
- assess impacts potentially affecting important features;
- characterise the impacts by describing their extent, magnitude, duration, reversibility, timing and frequency;
- identify cumulative impacts (as detailed in **Chapter 21: Cumulative Effects (Volume 1)**);
- identify potential significant effects of impacts in the absence of any mitigation;
- incorporate measures to avoid and mitigate (reduce) these impacts;
- assess the significance of any residual effects after mitigation;
- identify appropriate compensation measures to offset significant residual effects (if any); and
- identify opportunities for enhancements (including assisting in delivering Biodiversity Net Gain).

7.4.10. For adverse impacts, CIEEM's Guidelines for Ecological Impact Assessment[33] has been adapted to classify the magnitude of impacts by a matrix approach to determine significance of effects. This is based on the approach used for road schemes in the UK by the Design Manual for Roads and Bridges[34]. Although the Proposed Scheme does not comprise of a road/bridge to which the public has access, this guidance provides a robust methodology for assessing impacts to terrestrial biodiversity and is considered suitable for this assessment.

7.4.11. This methodology will be used to assess both the construction and operation phases of the Proposed Scheme.

SIGNIFICANCE CRITERIA

Magnitude

7.4.12. The magnitude relates to the level of change that the receptor will receive compared to the baseline conditions, using the duration of the impact, timing, scale, size and frequency to determine the magnitude of the impact to each receptor. Magnitude of impact is evaluated in accordance with the definitions set out in CIEEM's Guidelines for Ecological Impact Assessment[33], summarised in **Table 7-5** below.

7.4.13. The following characteristics will be used to assess the magnitude of the impact on ecological features as a result of the Proposed Scheme:

- Type of impact – beneficial or adverse;
- Extent or spatial scope of the impact;
- Reversibility of impact – whether the impact is naturally reversible or reversible through mitigation measures;
- Timing and frequency of the impact, in relation to ecological changes; and
- Likely duration of the impact – short term (< 1 year), medium term (1 - 5 years) or long term (5 or more years) (as set out in CIEEM's Guidelines for Ecological Impact Assessment[33]).

Table 7-5: Terrestrial Biodiversity Definitions of Impact Magnitude Classes

Magnitude of impact	Definition
High	Total loss or large alteration to key elements/features of the baseline conditions.
Medium	Partial loss or alteration to one or more key elements/features of the baseline conditions.
Low	Small shift away from baseline conditions.
Negligible	Very slight change from baseline conditions.

Value and Sensitivity

7.4.14. As described within **Chapter 4: EIA Methodology (Volume 1)**, sensitivity is a means to measure how affected receptors/processes and/or the receiving environment is likely to respond to change. The sensitivity is assigned at the receptor/process level. This may be defined in terms of quality, value, rarity or importance, and be classed as International, UK/National, Regional/County, District, Local.

7.4.15. **Table 7-6** summarises the ecological feature conservation value and/or sensitivity adapted from CIEEM's Guidelines for Ecological Impact Assessment[33] for habitats and species, which has been adapted for use in this assessment. CIEEM uses the term "*Importance*" to reflect value and sensitivity, and this term has been adopted.

Table 7-6: Terrestrial Biodiversity Description of Value and Sensitivity (i.e. ecological "importance")

Importance	Criteria
International	• Habitats - An internationally designated site or candidate site; SPA, candidate SPA, SAC, candidate SAC, SCI, Ramsar Site, Biogenetic/Biosphere Reserve, World Heritage Site or an area that 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, which are essential to maintain the viability of a larger whole. • Species - A sustainable population of an internationally important species or species listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP) which is listed in Annex IV of the Habitats Directive, or as being of unfavourable conservation status in Europe, of uncertain conservation status or of global conservation concern in the UK BAP. Sites supporting a breeding population of such a species or supplying a critical element of their habitat requirements.
UK/National	• Habitats - A nationally designated site, SSSI, NNR, Marine Nature Reserve or a discrete area, which would meet the published selection criteria for national designation (e.g., SSSI selection guidelines). A sustainable area of a priority habitat identified in the UK BAP, or of smaller areas of such habitat which are essential to maintain the viability of a larger whole. Areas of HPI, Ancient Woodland or Wood Pasture and Parkland HPI. • Species - Any regularly occurring/large population of a nationally important species (e.g., Red Data Book). A large population of a species identified as a Species of Principal Importance (SPI). A species population that would qualify for SSSI designation.
Regional/County	• Habitats - viable areas of key habitat identified in county/district BAP, or smaller areas of such habitat which are essential to maintain the viability of a larger whole. County sites that the designating authority has determined meet the published ecological selection criteria for designation. A diverse and/or hedgerow network comprised of mostly Important Hedges. Degraded areas of HPI (excluding Wood Pasture and Parkland HPI and Ancient Woodland Lowland Mixed Deciduous Woodland HPI which is Ancient Woodland). • Species - A regularly occurring, locally significant number of a nationally important species. Any regularly occurring, locally significant population of a SPI or a species listed in a county/district BAP (where available). A regularly occurring, locally significant population of a county/district important species. Sites supporting populations of

Importance	Criteria
	internationally/nationally/regionally important species that are not threatened or rare in the region or county, and not integral to maintaining those populations. Sites/features scarce in the county or that appreciably enrich the county habitat resource.
District	• Habitats - Areas of habitat that appreciably enrich the local habitat resource (e.g., species-rich hedgerows, ponds). Sites that retain other elements of semi-natural vegetation that, due to their size, quality or the wider distribution within the local area, are not considered for the above classifications. • Species - Populations/assemblages of species that appreciably enrich the biodiversity resource within the local context. Sites supporting populations of county/district important species that are not threatened or rare in the region or county and are not integral to maintaining those populations.
Local	• Habitats - Common and widespread habitat, not meeting any of the above criteria. Areas of heavily modified or managed vegetation of low species diversity or low value as habitat to species of nature conservation interest. • Species - Common and widespread species, not meeting any of the above criteria. Commonplace feature of little or no habitat/historical significance. Loss of such a feature would not be seen as detrimental to the ecology of the area.

7.4.16. The importance of ecological features has been evaluated where sufficient baseline data is available at the time of writing. Survey and data analysis is on-going for many of the ecological features under assessment, and therefore it has not been possible to evaluate the importance of all features as part of this preliminary assessment. Where this is the case for a particular ecological feature it has been noted in its baseline condition description (**Section 7.6**).

Significance

7.4.17. The overall significance will be assessed using the matrix shown in **Table 7-7**, which has been modified to align with **Chapter 4: EIA Methodology (Volume 1)**. This uses sensitivity of the receptor and magnitude of change to determine significance. Where a range of significance of effect is identified the final assessment for each effect is based upon professional judgement.

7.4.18. In accordance with **Chapter 4: EIA Methodology (Volume 1)** any effects with a significance level of 'Moderate' or above will be concluded to be significant.

Table 7-7: Terrestrial Biodiversity Significance of Effects Matrix

		Magnitude of Impacts			
		High	**Medium**	**Low**	**Negligible**
Value /Sensitivity	**International**	Major	Major to Moderate	Moderate	Negligible
	UK/National	Major	Major to Moderate	Moderate	Negligible
	Regional/ County	Major to Moderate	Moderate	Minor to Moderate	Negligible
	District	Moderate	Minor to Moderate	Minor	Negligible
	Local	Minor	Minor	Negligible	Negligible

7.5. STUDY AREA

7.5.1. For the assessment of impacts during construction and operation, the Study Areas for potential sensitive receptors are set out in **Table 7-8**. This approach is consistent with current good practice guidelines published by the CIEEM[27].

7.5.2. The assessment will consider the likely effects of the Proposed Scheme on ecological features within its ZOI. ZOI is a term used in CIEEM guidance[27] which has been used in this chapter rather than Study Area. The ZOI is the area over which ecological features may receive impacts from the Proposed Scheme. It covers the Site and the wider landscape, where pathways exist for the transfer of impacts away from the Site.

7.5.3. The sensitivity of ecological features present is also taken into account when determining the ZOI, as it will be greater where more sensitive ecological features are present. The ZOI for the Proposed Scheme have been determined by:

- consideration of the activities during construction and operation associated with the Proposed Scheme and the scale of the works;
- Emissions of the works including changes in air quality, production of dust, noise and run-off;
- the duration and timing of the works; and
- ecological data, including the use of online inventories of designated sites and habitats, aerial photography and OS mapping, records of protected and notable species, and findings from field survey work.

7.5.4. The ZOI are the same for terrestrial biodiversity for both the construction and operation phases.

7.5.5. The ZOI are shown on **Figure 7-1: Terrestrial Biodiversity Study Areas (Volume2)**.

Table 7-8: Terrestrial Biodiversity Zones of Influence

Receptor	Zone of Influence
Statutory Designated Sites – National Network Sites (SAC/SPA/Ramsar)	Within 15km of the Site Boundary.
Statutory Designated Sites – SSSI	Within 10km of the Site Boundary.
Statutory Designated Sites – NRR, LNR	Within 2km of the Site Boundary.
Non-statutory Designated Sites	Within 2km of the Site Boundary.
Habitats of Principal Importance (HPI)	Within 250m of the Site Boundary.
Other Terrestrial Habitats	Within the Site Boundary.
Bats	Within the Site Boundary and 25m of the Site Boundary.
Breeding Birds	Within the Site Boundary and 25m of the Site Boundary.
Notable Plants and Invasive Species	Within the Site Boundary and 25m of the Site Boundary.
Reptiles	Within the Site Boundary and 25m of the Site Boundary.

Receptor	Zone of Influence
Terrestrial Invertebrates	Within the Site Boundary and 25m of the Site Boundary.
Water Vole	Within the Site Boundary and 25m of the Site Boundary.
Wintering Birds	Within the Site Boundary and along the adjacent section of the River Thames.
Freshwater Fish (including European eel)	Within the Site Boundary and hydrologically connected watercourses.
Aquatic Macroinvertebrates	Within the Site Boundary and hydrologically connected watercourses.
Macrophytes	Within the Site Boundary and hydrologically connected watercourses.

7.6. BASELINE CONDITIONS AND FUTURE BASELINE

7.6.1. The key sources of information on baseline terrestrial and aquatic biodiversity conditions are the following:

- Open source 1:25,000 Ordnance Survey datasets[35];
- Freely downloadable Natural England datasets and citations[36];
- Multi Agency Geographic Information System Mapping (MAGIC)[37];
- Environment Agency Ecology and Fish Data Explorer[38];
- Greenspace Information for Greater London[39]; and
- Ecological surveys of the Site, including those undertaken to map habitats.

Designated Sites

7.6.2. The designated sites described within this section are described in **Table 7-9**.

7.6.3. There is one internationally designated terrestrial biodiversity site (Epping Forest SAC) within 15km of the Site Boundary (shown on **Figure 7-2: Internationally Important Statutory Designated Sites (Volume 2)**). There are six statutory nature conservation sites designated as SSSI within 10km of the Site Boundary (shown on **Figure 7-3: Nationally Important Statutory Designated Sites (Volume 2)**). Evaluation reflects the geographical basis of the designations, i.e., internationally important sites support habitats and species that are deemed important at an International biogeographical level, whilst SSSI are designated on the basis of supporting the best example(s) of particular habitat(s), species and ecosystem(s) at a National level of importance.

7.6.4. There are three statutory nature conservation sites designated as LNR within 2km of the Site Boundary (Shown on **Figure 7-4: Other Statutory Designated Sites / Non-statutory Designated Sites (Volume 2)**). They are valued as being of County importance, representing part of a London-wide network of semi-natural habitats designated for their value on this geographic scale.

7.6.5. Seven further SSSI are found within 10km of the Site Boundary. However, these are designated for geological features only, possessing no biological features in their citation, and thus they are not in the scope of this preliminary assessment. This includes Abbey Wood SSSI which is not designated an SSSI for the protection of woodland, but for the protection of fossil beds. The effects on geological sites will be assessed in **Chapter 17: Ground Conditions and Soils (Volume 1)** of the ES.

7.6.6. Three non-statutory designated sites are partially located within the Site (which are described further in **Table 7-9** and shown on **Figure 7-4: Other Statutory Designated Sites / Non-statutory Designated Sites (Volume 2)**). A further 18 non-statutory designated sites are situated within 2km of the Site Boundary, the closest of which are Lower River Beam and Ford Works Ditches SINC and Dagenham Breach and the Lower Beam River in Dagenham SINC, which both lie approximately 500m to the north of the Site Boundary. They are valued as being of County importance, representing part of a London-wide network of semi-natural habitats designated for their value on this geographic scale.

7.6.7. Desk study areas were selected on the basis of CIEEM guidance[27] and professional judgement. Considering the characteristics of the Site and the Proposed Scheme, direct and indirect impacts are unlikely to extend beyond these areas.

Table 7-9: Designated Sites Summary

Designated Site	Approximate Distance from Site Boundary	Description
Epping Forest SAC	11.8km northwest	Epping Forest is London and Essex's largest green space, hosting over a million trees, (many of which are veteran) including ancient stands of beech, oak and hornbeam. The long history of pollarding has led to significant amounts of dead wood, making the area rich in fungi, epiphytes – including the moss *Zygodon forsteri*, and rare insect species such as the stag beetle *Lucanus cervus*.
Inner Thames Marshes SSSI	0.9km east	The Inner Thames Marshes form the largest remaining expanse of wetland bordering the upper reaches of the Thames Estuary. The SSSI comprises a major relic of low-lying grazing marsh with a variety of grassland communities dissected by a network of fresh to brackish water drains. The grasslands, particularly those on the Wennington and Aveley Marshes, are also important for the large extent and abundance of divided sedge *Carex divisa*, saltmarsh rush *Juncus gerardii* and pink water-speedwell *Veronica catenata*.
Ingrebourne Marshes SSSI	2.3km northeast	The site is the largest area of freshwater marsh in Greater London. It is very diverse, with large areas of reed sweet-grass, common reed swamp, wet neutral grassland and tall fen. These habitats have a wide variety of invertebrates and breeding birds. Invertebrates include sixteen nationally scarce fly, beetle dragonfly and cricket species. There are two nationally rare Red Data Book species, the hoverfly *Anasimyia interpuncta* and the scarce emerald damselfly *Lestes dryas*. Sixty-one species of bird regularly breed on the site. The London Borough of Havering has raised the water level and reintroduced grazing to protect the wetland.
Oxleas Woodlands SSSI	5.9km southwest	Oxleas Wood is one of the few remaining areas of ancient deciduous forest in Eltham in the Royal Borough of Greenwich (with a small amount passing over the boundary and stretching into the LBB), in southeast London. Some parts date back over 8,000 years to the end of the last ice age. It is part of a larger continuous area of woodland and parkland on the south side of Shooter's Hill.

Designated Site	Approximate Distance from Site Boundary	Description
West Thurrock Lagoon and Marshes SSSI	8.0km southeast	The site is important for wintering waders and wildfowl which feed on the mudflats. Migratory warblers breed on reed beds in the lagoon, and waterfowl roost on the shallow waters and grassy islands. Stone Ness saltings is a large area of salt marsh dominated by sea club-rush *Bolboschoenus maritimus.*
Ruxley Gravel Pits SSSI	9.8km south	Over 500 species of vascular plants and 169 of birds have been recorded. Fifty-three of the bird species are breeding. Insects include 23 species of butterfly, 9 dragonfly and over 500 beetles. This variety reflects the diversity of habitat: wooded islands, fringes of mature trees, scrub, fen and open water. Vegetation on the banks include the rare club rush *Schoenoplectus tabernaemontani*. The open water areas have rafts of yellow and white water-lily *Nuphar* spp.
Crossness LNR	Within, and adjacent, the Site	A network of ditches and open water, scrub and rough grassland, providing a water vole *Arvicola amphibius* stronghold. Over 200 different species of bird have been recorded at Crossness LNR. A number of rare aquatic and terrestrial invertebrates are present, as well as some important flora species.
Rainham Marshes LNR	0.9km east	The grasslands, fringing reedbeds and network of ditches here support a number of rare plants, insects and birds and are also home to a large population of water voles. Plants including golden dock, scarce emerald damselfly, water voles and birds including lapwing, sedge and reed warbler have been recorded.
Lesnes Abbey Woods LNR	1.1km southwest	Ancient woodland and coppice with one of the most important populations of wild daffodils in southeast England. Other habitats include parks and open spaces, heathland, wetlands and hedgerows. Stag beetles, song thrush, bats and newts as well as a wide range of other woodland and parkland birds, animals and insects have been recorded within the Reserve. A recent comprehensive study of the site has found 906 species of invertebrate, 46 birds including Red Data Book redwing and fieldfare, 59 species of fungi, 292 species of plants and 12 species of mammal.

Designated Site	Approximate Distance from Site Boundary	Description
SINCs	Ranging from within the Site Boundary, to approximately 2km from the Site Boundary	River Thames and Tidal Tributaries MSINC falls within the Site: The River Thames and the tidal sections of creeks and rivers which flow into it comprise mudflats, shingle beach, inter-tidal vegetation, islands and river channel. Erith Marshes MSINC falls within the Site: One of the few remaining examples of the Thames-side grazing marshes, important for its breeding and wintering avifauna and rare plants. The ditches also support an important population of water vole, as well as the fish rudd *Scardinius erythrophthalmus* and tench *Tinca tinca*. A variety of Red Data Book and notable invertebrates are also found on site. Belvedere Dykes SINC falls within the Site: The drainage dykes comprising reedbed, wet woodland and grassland habitats. There are 18 further SINC within 2km of the Site Boundary, comprising a mixture of lakes, wetland habitats, reedbeds, broadleaved woodland, semi-improved neutral and acid grassland, heathland and scrub habitats. The following SINC have been identified within 2km of the Site Boundary: • Dagenham Breach and the lower Beam River in Dagenham SINC (500m to the north); • Lower River Beam and Ford Works Ditches SINC (500m to the north); • Southmere Park & YarntonWay/Viridion Way SINC (700m to the southwest); • Crossness Sewage Treatment Works Pond SINC (900m to the west); • Franks Park Belvedere SINC (1km to the south); • Wennington, Aveley and Rainham Marshes SINC (1km to the east); • Lesnes Abbey Woods and Bostall Woods SINC (1.2km to the southwest); • Thamesview Golf Course SINC (1.2km to the west); • Riverside Sewage Treatment Works SINC (1.2km to the northeast); • Mudlands SINC (1.5km to the north);

Designated Site	Approximate Distance from Site Boundary	Description
		• St John the Baptist Churchyard, Erith SINC (1.5km to the southeast); • Crossway Park and Tump 52 SINC (1.5km to the west); • The Ridgeway SINC (1.5km to the west); • Crossways Lake Nature Reserve and Thameside Walk Scrub SINC (1.6km to the west); • Hollyhill Open Space SINC (1.8km to the south); • Rainham Railsides SINC (1.8km to the north); • Goresbrook and the Ship & Shovel Sewer SINC (2km to the northwest); and • Streamway, Chapman's Land and Erith Cemetery SINC (2km to the south).

7.6.8. Specific Habitats Regulations Assessment (HRA) documentation is provided (a report is presented in **Appendix 7-2: Information to Inform a Habitat Regulations Report: Stage 1 – Screening (Volume 3)**.

Habitats

Relationship with Riverside 2

7.6.9. Since the start of Riverside 2 construction some habitats have been converted into hardstanding for car parking, cabins, storage and lay down areas. These comprised modified grassland and open mosaic habitat and are indicated on **Figure 7-6: Site UKHab Survey Map (Volume 2)**. Mitigation for the loss of these habitats will be undertaken by Riverside 2 in the following manner:

- Modified Grassland – habitat loss compensated for through off-site habitat creation; and
- Open Mosaic Habitat – habitat loss compensated for through partial reinstatement of habitat upon completion of development and through off-site habitat creation.

7.6.10. The habitat loss resulting from Riverside 2 and that has been compensated for by off-site habitat creation is not considered an effect of the Proposed Scheme and is not considered further. However, as the Proposed Scheme includes construction over the area where open mosaic habitat would be reinstated, this has been included in the habitat baseline.

Habitats of Principal Importance (HPI)

7.6.11. Desk study data confirmed deciduous woodland HPI (lowland mixed deciduous woodland; approximately 1.7% of the Site), Coastal and floodplain grazing marsh HPI (approximately 10.9% of the Site), and intertidal mudflats HPI (approximately 10.0% of the Site) within the Site. Coastal saltmarsh HPI is found adjacent to the Site Boundary but not within it. The presence of these habitats was confirmed by site surveys undertaken in February 2023. The location of these HPI in relation to the Site are shown on **Figure 7-5: Habitats of Principal Importance (Volume 2)**. All identified HPI are accommodated within Crossness LNR or the three SINC found within the Site and are essential to maintain their continued viability. For this reason, HPI have been evaluated as being of County importance.

7.6.12. Desk study data indicates that good-quality semi-improved grassland HPI is also present; however, preliminary results of botanical surveys indicate this is more accurately classified as Coastal and floodplain grazing marsh HPI. These results will be fully discussed in the ES.

7.6.13. There is no ancient woodland within the Site or within 1km of the Site Boundary (as detailed in **Chapter 10: Townscape and Visual Impact (Volume 1)**).

Other Terrestrial Habitats

7.6.14. The majority of the Site comprises river habitat (approximately 41.7%) within the River Thames and Tidal Tributaries MSINC and has been evaluated as of County importance.

7.6.15. Terrestrial habitat types within the Site comprise modified grassland (approximately 6.3%), reedbeds (approximately 2.4%), other neutral grassland (approximately 4.6%), mixed scrub (approximately 3.7%), open mosaic habitat (approximately 1.6%) and standing water (approximately 1.8%). All are common and widespread habitat types within the UK and are frequently disturbed and modified both as a result of development and land management, and thus have been evaluated as of Local importance.

7.6.16. There is no ancient woodland, ancient or veteran trees or important hedgerows within the Site or the wider ZOI of the Proposed Scheme.

7.6.17. The remaining areas within the Site are formed of developed land, artificial unvegetated unsealed surface (comprising tracks and patches of disturbed bare ground), hardstanding and buildings. They have been scoped out of further assessment as they have no ecological value.

7.6.18. The habitats within the Site are shown on **Figure 7-6: Site UKHab Survey Map (Volume 2)**.

Freshwater Aquatic Habitats

7.6.19. An initial aquatic habitat survey was carried out in November 2022. These assessments form the preliminary phase of the freshwater ecology surveys and have been used to characterise watercourses and identify further survey requirements.

7.6.20. The freshwater watercourses surveyed were typically realigned and over-deepened minor watercourses that were ditch-like in nature. The watercourses were characterised by small channel dimensions with limited hydrogeomorphic activity. Habitat diversity was poor, and the watercourses were typically homogenous with uniform bed and bank profiles dominated by glide/slack flow and fine sediment, with no channel features (such as pools, riffles and bars) and no marginal features (such as exposed/submerged tree roots and undercut banks). During a site visit in June 2023 the watercourses were overgrown with reed stands. Despite the anthropogenic influence on the aquatic ecosystem, due to the contribution of these habitats to overall habitat diversity, the aquatic habitats are considered to be of District importance.

7.6.21. The aquatic habitats within the Site are shown on **Figure 11-1: Surface Water Features (Volume 2)**.

Protected/Notable Species

Bats

7.6.22. Desk study records show eight species of bats have been recorded within 2km of the Site Boundary comprising: common pipistrelle *Pipistrellus pipistrellus*; soprano pipistrelle *Pipistrellus pygmaeus;* Nathusius's pipistrelle *Pipistrellus nathusii;* brown long-eared bat *Plecotus auratus;* Natterer's bat *Myotis nattereri;* noctule *Nyctalus noctule;* Daubenton's bat *Myotis daubentonii;* and serotine *Eptesicus serotinus*. The closest record was of noctule, approximately 250m from the Site Boundary, in May 2014.

7.6.23. A Preliminary Bat Roost Assessment (PBRA) of the buildings within the Site was undertaken in July 2022. The assessment concluded that all buildings on Site, including the jetties within the River Thames, have negligible bat roost suitability. This is in line with findings of the Riverside 2 ES[40].

7.6.24. Survey visits (undertaken in February 2023) identified no semi-mature or mature trees to be present (providing roosting opportunities for bats) however, this work was limited by access constraints. Further survey during spring and summer 2023 when access limitations were removed did not identify semi-mature or mature trees that could support roosting bats in the remainder of the Site. Trees within woodland along the Site Boundary's southern perimeter could support roosts; however, the Proposed Scheme does not intend to alter it.

7.6.25. Bat foraging habitat within the Site includes rivers, ditches, broadleaved woodland, coastal and floodplain grazing marsh and grassland. The Site conforms to habitat of High suitability for foraging and commuting bats[41]. Bats will be fully evaluated in the ES using data from surveys that are currently underway.

Breeding Birds

7.6.26. Desk study results recorded 59 species of bird; 19 of WCA Schedule 1[15] species and 30 of Birds of Conservation Concern Red listed. Crossness LNR and Crossness Sewage Treatment Works are also known to be of value to breeding bird communities. The breeding bird community will be fully evaluated in the ES using data from surveys that are currently underway.

Hazel Dormouse

7.6.27. The desk study did not return results for hazel dormouse *Muscardinus avellanarius* and the majority of the Site does not contain suitable habitat for this species. The small area of woodland and scrub in the south of the Site Boundary may be suitable for supporting dormouse; however, the Proposed Scheme does not intend to alter it. Given the history of recent developments within and surrounding the Site (including Riverside 2) and the lack of dormouse evidence found by their supporting ecological surveys, as well as the lack of records of this species, it is not likely that hazel dormouse is present within the Site.

Notable Plants and Invasive Species

7.6.28. The desk study returned one non-native invasive fauna and 20 flora species within 2km of the Site Boundary, listed on WCA Schedule 9[15] and/or the London Invasive Species List[42]. The Site's botanical community will be fully evaluated in the ES using data from surveys that are currently underway.

Reptiles

7.6.29. Three records of reptiles were returned by the desk study within 2km of the Site Boundary, comprising slow worm *Anguis fragilis*, grass snake *Natrix helvetica* and common lizard *Zootoca vivipara*. Lowland mixed deciduous woodland, Coastal and floodplain grazing marsh, semi-improved grassland and mixed scrub habitats within the Site Boundary have the potential to support common species of reptiles. Reptile surveys, undertaken within the central part of the Site in 2022 as part of the Riverside Heat Network Project ecological surveys[43], recorded two individuals of common lizard. In addition, ecological mitigation in the form of habitat manipulation is being undertaken as part of the construction of Riverside 2 to avoid effects on reptiles[44]. Reptiles will be fully evaluated in the ES using data from surveys that are currently underway.

7.6.30. All three reptile species are partially protected under WCA Schedule 5. They are also listed as SPI for the Conservation of Biodiversity in England under Section 41 of the NERC Act 2006[17].

Otter

7.6.31. The desk study did not return any records of otter *Lutra lutra*, and little of the Site provides suitable habitat for otter holts, despite the proximity of the River Thames, which is known to support otter[45]. The small area of woodland and scrub in the south of the Site Boundary may be suitable for supporting otter but to date access has not been possible. Given the history of recent developments within and surrounding the Site Boundary (including Riverside 2) and the lack of otter evidence included within the supporting evidence, it is not likely that otter are present within the Site.

Terrestrial Invertebrates

7.6.32. The desk study returned 23 notable terrestrial invertebrate species records, including: 17 species listed under Section 41 of the NERC Act 2006[17]; 17 London Priority Species; and two species listed under Annex II of the Habitats Regulations. Twenty-two of these notable species were recorded within 250m of the Site Boundary, including 10 species within 20m of the Site Boundary. Public bodies have an obligation under Section 40 of the NERC Act to have regard for species of principal importance (SPI) when carrying out their functions. Terrestrial invertebrates will be fully evaluated in the ES using data from surveys that are currently underway.

7.6.33. Coastal and floodplain grazing marsh, lowland mixed deciduous woodland, reedbeds and pond habitats on the Site may provide suitable habitat for a range of notable terrestrial invertebrate species.

Water Vole

7.6.34. Two hundred and seventy-eight records of water vole *Arvicola amphibius* were returned by the desk study, not least: water vole surveys undertaken within the central part of the Site in 2022, as part of the Riverside Heat Network Project[43], recorded evidence of water vole in the ditches throughout the Site; recent surveys for other projects, including Riverside 2, show an important water vole population is present within the Site[28]. Management and maintenance of d itches has, and continues to be, undertaken under Natural England licence for water voles. Water voles will be fully evaluated in the ES using data from surveys that are currently underway.

7.6.35. Water vole is protected from killing and injury and its place of rest or shelter (burrow) is protected from damage, destruction or obstruction under the WCA. Additional protection from disturbance is extended to individuals occupying places of rest or shelter. Water vole is also listed as SPI in accordance with Section 41 of the NERC Act 2006[17]. Public bodies have an obligation under Section 40 of the NERC Act 2006[17] to have regard for these species when carrying out their functions.

Wintering Birds

7.6.36. The River Thames lies within the Site Boundary and is regularly used by migrating birds and those seeking foraging grounds for winter. The floodplain grazing marsh within the Site also provides suitable habitat for wintering birds, and Crossness LNR is known to be important for wintering bird populations.

7.6.37. Survey work recorded 61 species of bird using the Site and its immediate surroundings during winter. Of these, 34 were water birds and 27 non-water bird species. In conservation status terms, three were SPI species, 12 were Birds of Conservation Concern Red[46] listed and 22 amber listed, and 13 listed as London Priority Species[47].

7.6.38. Aquatic habitat (open water and mudflat) beyond the Thames floodwall is used regularly by wintering birds for foraging, loafing and roosting; it supports the highest numbers of wintering birds and the widest variety of species, almost exclusively water birds. Of note is the sewage outfall from Crossness Water Treatment Works, which is highlighted as a foraging area for winter bird species, particularly ducks such as teal, gadwall and wigeon. No high tide roosts were found within the Site, with the nearest being on the opposite bank of the River Thames. Whilst individual birds or pairs occasionally roosted on Belvedere Power Station Jetty (disused) and wooden posts within Thames-side reedbed habitat; significant numbers of birds were not seen using these structures.

7.6.39. Relatively few species of bird, in small numbers, were observed to use terrestrial habitats within the Site. The most significant area used was grassland in the southwest of the Site, within Crossness LNR. Fields along Norman Road were used only sparingly by wintering birds.

7.6.40. None of the peak counts of individual wintering bird species recorded during the survey were higher than the WeBS annual peak count for the River Thames – Barking recording zone or reach the 1% national threshold[48]. The wintering bird community comprises regularly occurring, significant numbers of important species, including SPIs and those of conservation concern. It has therefore been evaluated as being of County importance.

Freshwater Fish

7.6.41. A search of the Environment Agency's Ecology and Fish Data Explorer returned no records of fish data from within the Site[38]. The River Thames is known to support migratory fish species including European eel *Anguilla anguilla*[31]. See **Chapter 8: Marine Biodiversity (Volume 1)**. European eel is a migratory species listed under Section 41 of the NERC Act 2006[17] as a SPI. The species is afforded further protection under The Eels (England and Wales) Regulations 2009[24] and is listed on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species[49] as being critically endangered.

7.6.42. Given the likely hydrological connection between the River Thames and the freshwater watercourses present within the Site, it is possible that European eel are present within the Site. See **Chapter 8: Marine Biodiversity (Volume 1)**.

7.6.43. Suitably qualified aquatic ecologists assessed the watercourses within the Study Area for their ability to support fish species during the optimal survey window (June 2023). Small drainage ditches comprised poor habitats, shallow, overgrown, and clogged by vegetation. Furthermore, ditches near Riverside 1 and Riverside 2 are exposed to high levels of surface water run off resulting in high turbidity watercourses not preferred by some species of fish. The larger watercourses provide suitable habitat for fish, with the assemblage likely comprising species that can tolerate the brackish conditions due to the vicinity to the tidal River Thames. The main channels are culverted into the River Thames, which present a barrier for migratory fish, however that does not preclude the presence of European eel. Three watercourses, Norman Road River, Great Breach Lagoon and Mulberry Way River have been sampled using eDNA techniques and results of these analysis will be reported in the ES.

Aquatic Macroinvertebrates

7.6.44. A search of the Environment Agency's Ecology and Fish Data Explorer returned data from EA aquatic macroinvertebrate surveys at a monitoring location on Norman Road River, a watercourse within the Site (NGR TQ 49318 80312), undertaken in 2013. The desk study data identified the following Invasive Non-Native Species (INNS): the New Zealand mud snail *Potamopyrgus antipodarum*; the bladder snail Physella acuta; and the amphipods *Crangonyx pseudogracilis/floridanus* and *Gammarus tigrinus*. The calculated Community Conservation Index (CCI) value of 14.64 classified the aquatic macroinvertebrate community within the Norman Road River as having a Fairly High conservation value[50].

7.6.45. Four watercourses have been surveyed by aquatic ecologists: North Dyke, Mulberry Way River; Great Breach Lagoon; and Norman Road River. Preliminary results suggest high conservation values of macroinvertebrate communities in North Dyke and Norman Road River. Mulberry Way River and Great Breach Lagoon were classified as low and moderate, respectively. Full aquatic macroinvertebrate analysis will be completed and evaluated in the ES.

7.6.46. Out of all ponds scoped in for Pond PSYM, only Pond 7 was surveyed, which is within the Site and Crossness LNR. The survey was undertaken in June 2023. The remaining ponds were either dry or inaccessible due to dense vegetation at the time of survey. Data has been sent to the Freshwater Habitats Trust for analysis. Preliminary results from PSYM suggest limited conservation value of the pond, with analysis to be fully evaluated in the ES.

Macrophytes

7.6.47. A search of the Environment Agency's Ecology and Fish Data Explorer returned data from an Environment Agency macrophyte survey at a monitoring location within the Great Dyke lagoon within the Site (NGR TQ 49318 80312), in August 2013. A total of 17 macrophytes species were recorded in the survey, all of which are recorded as flowering macrophyte species. The most dominant species recorded in the Environment Agency macrophyte survey were reedmace *Typha latifolia* and common reed *Phragmites australis*. No protected or otherwise notable macrophyte species were recorded in the survey, nor were any INNS.

7.6.48. Due to Health and Safety derived access restrictions, it was not possible to undertake ditch surveys in full accordance with the standard methodology for the Coastal Grazing Marsh habitat. However, the assemblage recorded was similar to expected based on the desk study results from the Environment Agency survey conducted in 2013, thus validating the field survey results. Reedmace *Typha latifolia* and common reed *Phragmites australis* were present. Duckweed *Lemna* spp., reedmace and common reed was recorded in abundance at Horse Head Ditch. No INNS or protected species were recorded during the site visit. However, the presence of INNS was identified as part of the desk study, therefore it cannot be ruled out that INNS are present within the freshwater habitats.

Evaluation Summary

7.6.49. **Table 7-10** provides a summary of results of the evaluation of ecological features, detailing the scale at which they are important.

Table 7-10: Ecological Features Evaluation Summary

Ecological Feature	Importance
Epping Forest SAC	International
SSSIs (Inner Thames Marshes SSSI, Ingrebourne Marshes SSSI, Oxleas Woodlands SSSI, Ruxley Gravel Pits SSSI and West Thurrock Lagoon and Marshes SSSI)	National
LNR (Crossness LNR, Rainham Marshes LNR, Lesnes Abbey Woods LNR)	County
SINC (Erith Marshes SINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, 18 further SINCs outside of the Site Boundary)	County
HPI (Deciduous Woodland, Coastal and floodplain grazing marsh, Intertidal mudflats, Coastal saltmarsh (adjacent to the Site Boundary)	County
Other habitats: river habitat	County
Other habitats: modified grassland, reedbeds, other neutral grassland, mixed scrub, open mosaic habitat, standing water	Local
Bats	Not currently known, will be reported in the ES
Breeding birds	Not currently known, will be reported in the ES
Notable plants and invasive species	Not currently known, will be reported in the ES
Reptiles	Not currently known, will be reported in the ES
Terrestrial invertebrates	Not currently known, will be reported in the ES
Water vole	Not currently known, will be reported in the ES
Wintering birds	County
Freshwater fish (including European eel)	Not currently known, will be reported in the ES
Aquatic macroinvertebrates	Not currently known, will be reported in the ES
Macrophytes	Not currently known, will be reported in the ES

FUTURE BASELINE

Overview

7.6.50. Climate change is the single most prevalent factor when attempting to predict the future baseline of an ecosystem or species community; not least as it affects ecology via multiple pathways. Impacts on species are considered to include changes in distribution and abundance, the timing of seasonal events and habitat use and, consequently, there are likely to be changes in the composition of plant and animal communities. Habitats and ecosystems are also likely to change in character.

7.6.51. Assessing the potential impacts of climate change on ecological features is problematic as species trends in distribution and population size are influenced by this and other factors. These include environmental considerations (such as atmospheric pollution and land use) and population biology (such as density dependence). These different factors can work in combination to bring about change.

7.6.52. Moorcroft & Speakman[51] present a study that summarises key research on the impacts of climate change on habitats and species in the UK, concluding that there is strong evidence that climate change is affecting UK biodiversity. Importantly, impacts are expected to increase as the magnitude of climate change increases.

7.6.53. The distributions of many species are shifting northwards, including some species which have colonised the UK from mainland Europe, while some species are seen to be utilising habitats at a higher altitude than known previously.

7.6.54. It is difficult to predict, with considerable confidence, the likely response of the key ecological features (as described in the section above) to climatic change. However, the following section presents known information on the medium and long term trends in distribution and abundance for such features.

7.6.55. The future baseline assumes that existing commercial business within the Site would remain at their current locations should the Proposed Scheme not proceed. These include Riverside 1, including Middleton Jetty and Munster Joinery Warehouse. Riverside 2 would be operational in the future baseline, its construction phase completed and associated effects no longer present.

Habitats

7.6.56. Grassland habitats are widespread across the Site, particularly floodplain grazing marsh. Such areas are considered to be highly sensitive to changes in rainfall. An increase in summer drought conditions has the potential to lead to a decline in wet grassland communities including floodplain grazing marsh, which may lead to a change in species composition in these habitats. It is not possible to predict whether there would be changes in land management or land use (such as modification of the grazing regime) on floodplain grazing marsh and what the effects would be.

7.6.57. Although woodland cover in the UK has increased slightly in the last 100 years, much of this is non-native tree species. Existing native woodlands are isolated, in poor ecological condition and present a decline in woodland wildlife. As well as direct habitat loss, climate change also poses a threat through impacts on/from: growing season; imported diseases; invasive plants; mammal browsing; and air pollutants[52].

Bats

7.6.58. Collins[41] examined trends in 11 species compared to a baseline year of 1999, which found that these species were either stable or increasing. Climate change may affect bat populations through changes in their annual hibernation cycle, breeding success and food availability.

Breeding Birds

7.6.59. The British Trust for Ornithology (BTO)[53] breeding farmland bird index has reduced by more than half since 1970 in the UK. This indicates a long term decline in farmland bird populations.

7.6.60. The breeding woodland bird index for the UK has declined by 30% between 1970 and 2018, and 5% over the recent short term period (2012-2027). The breeding water and wetland bird index for the UK fell by 6% between 1975 and 2018, but over the short term (2012-2027) increased slightly by 3%.

Notable Plants and Invasive Species

7.6.61. Botanical species in the UK are generally in decline. State of Nature 2019[54] reports the occupancy indicator for vascular plants is 4% lower compared to 1970, with little, short term change in average distribution. 440 plants (18%) are classified as being at risk of extinction from Great Britain. These declines are due to a variety of factors, including climate change, habitat loss, and change in land management practises. However, State of Nature 2019[54] also reports the rise in invasive species within the UK, with an average of 10–12 new non-native species becoming established in the UK annually, and that 10–20% of these cause serious adverse impacts.

Reptiles

7.6.62. Evidence from the BTO Research Report 572[55] points to general declines in common lizard, slow worm, grass snake and adder. There is a documented decline in sand lizard numbers and there is thought to be a decline in smooth snake, although current trends are largely unknown. Warming, though climate change, could increase reptile growth and reproductive rates due to longer periods of activity with reduced hibernation lengths and earlier emergence. However, research suggests the increase in food resource requirements (due to the increased periods of activity) may not be met fully by increased foraging, particularly when warm weather restricted their activity[56].

Terrestrial Invertebrates

7.6.63. State of Nature 2019[54] reports that the occupancy indicator for insects shows a decrease in average distribution of 10% over the long term, and 8% over the short term, with 405 invertebrates (12%) classified as being at risk of extinction from Great Britain. Butterflies and moths have been particularly hard hit, with numbers of butterflies down by 17% and moths down by 25% since 1970. Species, such as the High Brown Fritillary and Grayling, that require more specialised habitats have declined by more than three quarters. These declines are due to a variety of factors, including climate change, habitat loss, and change in land management practises.

7.6.64. London is a hotspot for stag beetle; however they have been in steep decline across Europe[57]. The decline in stag beetle numbers is attributed to the tidying up of parks, gardens and greenspaces and the removal of tree stumps and dead wood.

Water Vole

7.6.65. Water voles were formerly widespread and common in England, Wales and Scotland, ranging from Cornwall to the extreme northeast of Scotland. Populations are still widespread but patchy and have undergone serious decline since the 1960s. The water vole is the UK's most rapidly declining mammal and has been lost from 94% of places where they were once prevalent[58]. Re-introduction programmes are attempting to slow the decline, but their effect on the conservation status of water vole is as yet unknown.

Wintering Birds

7.6.66. A number of wintering wildfowl and wader species have declined significantly in their abundance in the UK, particularly in west coast estuaries, as they migrate shorter distances in the non-breeding season, and many have shifted northeastwards to new feeding grounds.

Freshwater Fish (including European eel)

7.6.67. Climate change is known to be affecting the River Thames, with both water temperature and sea levels continuing to rise above historic baselines[59]. Studies report an observed decline in the number of fish species found in the Tidal Thames, however further research is needed to determine the cause[59].

Aquatic Macroinvertebrates

7.6.68. Many aquatic macroinvertebrate species are dependent upon good water quality for survival. As a result, they are sensitive to the effects of climate change, such as increased siltation, that may lead to a decline in water quality. Changes in annual water cycles, such as altered flow rates and the drying out of some habitats, are also likely to impact aquatic macroinvertebrate communities[60].

7.6.69. Spring aquatic macroinvertebrate numbers could decline by about 20% for every 1°C increase in temperature, whilst a 3°C increase could result in a reduction by over 40%. Some species may be replaced by other species better adapted to warmer conditions, meaning that ecosystem function may persist whilst community composition is altered[60].

7.6.70. Changes in the flow conditions of UK rivers attributed to changes in precipitation patterns are likely to affect aquatic macroinvertebrate species that are sensitive to flow rates. This may subsequently lead to a shift in the aquatic macroinvertebrate community compositions seen in UK freshwater habitats[61].

Macrophytes

7.6.71. Changes in temperature, carbon dioxide and precipitation linked to climate change have the potential to directly alter macrophyte communities within UK freshwater systems. The combined effects of climate change are likely to cause an increase in the abundance and distribution of emergent and floating macrophyte species within lakes, whilst the abundance of submerged macrophyte species diminishes. Climate change may also lead to indirect impacts on macrophyte communities, through the introduction of INNS and changes in nutrient cycles[33].

Summary

7.6.72. Whilst there may be some changes in species populations and distribution in the longer term due to climate change, changes in land management or land use (such as modification of the grazing regime) would be likely to have a greater influence on biodiversity over much of the ZOI (described in **Section 7.5** above).

7.6.73. To provide information on medium term changes in species distribution that may be affected by the construction and operation of the Proposed Scheme, and due to the mobile nature of several species of conservation concern which may be impacted by the Proposed Scheme, further surveys will be necessary for certain species prior to the commencement of construction works and mitigation measures adapted accordingly.

7.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

7.7.1. This section sets out the embedded design, mitigation and enhancement measures relevant to the terrestrial biodiversity assessment in this PEIR.

CONSTRUCTION PHASE

7.7.2. Relevant design, mitigation and enhancement measures will be identified in the ES, and these will include:

- Implementation of a CoCP, (an OCoCP will be submitted as part of the application for development consent).
- Adherence to relevant Environmental Permits, Best Practice Guidance and Regulations, British Standards, and monitoring for the protection of ecological features.
- Timing of works to avoid sensitive periods for particular species, such as avoidance of the bird nesting season for habitat clearance, and the migration periods for sensitive fish species.
- Lighting levels would be kept to a minimum necessary for security and safety and designed (where practicable) to avoid light spillage beyond the Site Boundary. This would be set out in the OCoCP.

7.7.3. Where impacts on habitats and species cannot be avoided or mitigated through adherence to standard best practice measures, and this would otherwise result in a potential significant adverse effect, compensation measures will be implemented. Compensation requirements will be confirmed in the ES, but will constitute a range of different interventions, depending on the species or habitat.

7.7.4. The main interventions may be grouped into the following general approaches:

- Results of the planned further surveys could indicate that protected species mitigation licences are required for the Proposed Scheme to commence. Any required protected species mitigation licences will be obtained from Natural England and will include species specific mitigation and monitoring measure as part of the licence application. These measures will be set out in the ES and the OCoCP (where relevant).
- Consolidation of structures and reduction of footprint of the Proposed Scheme – creating space within the Site for retention of habitats or new habitats. Ecological constraints and opportunities are being considered as part of the design evolution of the Proposed Scheme.
- Habitat creation and enhancement – creation of new areas habitat to replace those potentially lost to the Proposed Scheme, alongside of improvement of existing areas of habitat (the Mitigation Area is located to the south and west of the Site as shown on **Figure 1-3: Indicative Site Layout Plan (Volume 2)**).

- Translocation or displacement – populations of animals will be moved or displaced from an area affected by the Proposed Scheme (the donor site) to a new receptor site, which will be managed for wildlife.
- Creation of features to offer replacement breeding, sheltering and hibernating opportunities for animal species, for example, reptile hibernacula, bat and bird boxes.

OPERATION PHASE

7.7.5. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- Ongoing design development may lead to the compression of the footprint of the Proposed Scheme to reduce habitat loss effects.
- Adherence to relevant Environmental Permits, Best Practice Guidance and Regulations, British Standards, and monitoring for the protection of ecological features.
- The final mitigation, compensation, enhancement, monitoring and site management measures required for the Proposed Scheme will be determined following completion of the planned surveys set out in **Section 7.4**, and having regard to planning policy requirements and/or the legislative protection afforded to the ecological feature.
- Managing operation, including maintenance activities, in order to avoid or minimise indirect effects, and minimising direct effects arising from land take will reduce the potential for likely significant effects on ecological features.
- Lighting levels would be kept to a minimum necessary for security and safety and designed (where practicable) to avoid light spillage beyond the Site Boundary. This would be set out in the Outline Lighting Strategy to accompany the application for development consent.

7.7.6. These measures will be set out in the ES, OLEMP and the DAD, which will be prepared as part of the application for development consent. The measures will also be set out in the OEMP which will be prepared prior to the Proposed Scheme commencing operation as part of the DCO application.

7.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

7.8.1. This section details the preliminary assessment of impacts and effects for the Proposed Scheme during both the construction and operation phases, considering the embedded design, mitigation and enhancement measures detailed in **Section 7.7**.

7.8.2. The demolition or retention of the Belvedere Power Station Jetty (disused) will not change the outcomes of the preliminary assessment of impacts and effects reported within this technical chapter, due to the fact that the preliminary assessment within this technical chapter is limited to the land-side areas within the Site. The demolition or retention of the Belvedere Power Station Jetty (disused) will be considered and confirmed in the ES within **Chapter 8: Marine Biodiversity (Volume 1).**

CONSTRUCTION PHASE

7.8.3. The likely significant effects for terrestrial biodiversity associated with the construction phase are set out below.

7.8.4. The construction assessment presented in this chapter is appropriate for both construction programme options, as set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

Habitat Loss and Fragmentation

7.8.5. Many ecological features are located at distance from the Proposed Scheme, without connecting habitats within the primarily urban/industrial landscape in its surroundings. In addition, deciduous woodland to the south of the Site, river habitat within the River Thames, and coastal saltmarsh outside of the Site Boundary will not be lost as a result of the Proposed Scheme directly, nor will connectivity with other habitats be altered. These features will therefore not be affected by habitat loss and fragmentation. These features comprise:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR.
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.

- Habitats of Principal Importance (HPI):
  - Deciduous woodland (lowland mixed deciduous woodland); and
  - Coastal saltmarsh (adjacent to the Site Boundary).
- Other Terrestrial Habitats:
  - River habitat.

7.8.6. Statutory and non-statutory designated sites within and adjacent to the Site Boundary (Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC) will be subject to habitat loss to allow construction of the Proposed Scheme. Fragmentation may also affect these sites but will be ameliorated through retention of important habitat links across the Proposed Development (e.g., ditch habitat within Erith Marshes MSINC) and their location within an industrialised landscape. All four sites are important at the County level.

7.8.7. Northeastern areas of the Crossness LNR are included within the Site Boundary, resulting in the loss of habitats in the Eastern and Stable Paddocks (field used for horse grazing and associated stabling), alongside a strip along the top of the Western Paddock (comprising a mixture of grasses, bare ground scrapes and reedbed). The area under the footprint of the Proposed Scheme represents 11.7% of the total area of Crossness LNR. Therefore, the magnitude of change is medium, and there is likely to be a direct, permanent, long term, **moderate adverse** (**significant**) effect on Crossness LNR.

7.8.8. Erith Marshes MSINC is coincident with Crossness LNR and therefore falls under the footprint of the Proposed Scheme at the same locations as identified above in **Paragraph 7.8.6**, but also at the drainage ditch adjacent to Norman Road ('Creekside'). The area under the footprint of the Proposed Scheme represents 3.5% of the total area of Erith Marshes MSINC. Therefore, the magnitude of change is medium, and there is likely to be a direct, permanent, long term, **moderate adverse** (**significant**) effect on Erith Marshes MSINC.

7.8.9. Belvedere Dykes SINC is found along the eastern side of the Site Boundary. The majority of this area will be used for laydown requiring temporary habitat clearance, but without permanent loss. An area of grassland adjacent to the eastern side of Riverside 1, and at the northern extent of the SINC within the Site, will be permanently lost to infrastructure providing connection to the Proposed Jetty. These areas represent 20.7% of the total area of Belvedere Dykes SINC. Therefore, the magnitude of change is medium, and there is likely to be a direct, permanent, long term, **moderate adverse** (**significant**) effect on Belvedere Dykes SINC.

7.8.10. River Thames and Tidal Tributaries MSINC coincides with the location of the Proposed Jetty, whose footprint is not currently confirmed, but will be located on the interface between mudflat and river habitat within the Thames. Therefore, the magnitude of change is medium, and there is likely to be a direct, permanent, long term, **moderate adverse** (**significant**) effect on River Thames and Tidal Tributaries MSINC.

7.8.11. Habitats, including HPI, some of which lie within the statutory designated sites identified above, will also be lost and may also be subject to fragmentation. These comprise:

- Coastal and floodplain grazing marsh HPI;
- Intertidal mudflats HPI;
- Open mosaic habitat;
- Other neutral grassland;
- Modified grassland;
- Mixed scrub;
- Reedbed; and
- Standing water.

7.8.12. Coastal and floodplain grazing marsh HPI is coincident with areas of Crossness LNR/Erith Marshes MSINC in the Eastern, Stable and Western Paddocks under the footprint of the Proposed Scheme, and intertidal mudflat HPI located within the River Thames under the footprint of the Proposed Jetty; both important at the County level. The magnitude of change is Medium. Therefore, there is likely to be a direct, permanent, long term, **moderate adverse (significant)** effect on Coastal and floodplain grazing marsh HPI and intertidal mudflat HPI. The magnitude of the remaining habitats falling under the footprint of the Proposed Scheme are important at the Local level. The magnitude of change is medium. Therefore, there is likely to be a direct, permanent, long term, **minor adverse (not significant)** effect on open mosaic habitat, other neutral grassland, modified grassland, mixed scrub, reedbed and standing water.

7.8.13. Habitat loss within the River Thames for construction of the Proposed Jetty, and terrestrial parts of the Site will remove foraging resources used by wintering birds. However, the location of the Proposed Jetty is not in an area used by large numbers of wintering birds for foraging, with only small numbers of water birds found using it for this purpose during survey. In addition, terrestrial habitats were not used by large numbers of wintering birds for foraging, and no high tide roosts are found within the Site. However, retention of the Belvedere Power Station Jetty (disused) would allow wintering birds to roost on the structure in the future. Wintering birds are important at the County level. The magnitude of change is minor. Therefore, there is likely to be a direct, permanent, long term, **moderate adverse (significant)** effect on wintering birds.

7.8.14. Surveys are on-going for the remaining ecological features for which the impact is relevant preventing the assessment of impacts and their significance. However, the following assumptions are reasonable given the level of detail available:

- Bats: direct, permanent, long term effect through loss of foraging and commuting areas within Crossness LNR and associated habitats;
- Breeding birds: direct, permanent, long term effect through loss of nesting and foraging areas within Crossness LNR and associated habitats;

- Reptiles: direct, permanent, long-term effect through loss of grassland and scrub habitat supporting reptiles;
- Terrestrial invertebrates: direct, permanent, long term, effect through loss of supporting habitat;
- Water voles: direct, permanent, long-term effect through loss of ditches supporting this species;
- Freshwater fish: indirect, temporary, long term, effect through loss of supporting habitat;
- Aquatic macroinvertebrates: direct, permanent, long term, effect through loss of supporting habitat; and
- Macrophytes: direct, permanent, long term, effect through loss of supporting habitat.

7.8.15. It is not possible at this stage to give a preliminary assessment of impacts of habitat loss and fragmentation on notable plants and invasive species as surveys have not been completed and data analysed. This will be presented in the ES.

Noise and Vibration

7.8.16. The effects of noise and vibration during construction will be limited to the Site and its immediate surroundings as they would not be transmitted at distance further than the Proposed Scheme's local area. Modelling work undertaken to inform the assessment in **Chapter 6: Noise and Vibration (Volume 1)** has analysed likely changes in noise and vibration during construction at five locations in the area surrounding the Proposed Scheme, at distances between approximately 70m and 600m from the Site Boundary, and the local trunk road network. Although the approach used is focussed on effects on human receptors, it anticipates that most construction phase activities will produce noise and vibration of negligible magnitude at these locations. It is therefore reasonable to conclude noise and vibration will only affect ecological features found within and adjacent to the Site Boundary (its 'local area'), with attenuation of noise over distance and screening by industrial, commercial and residential buildings limiting the transmission of effects. In addition, habitats are not considered to be sensitive to noise and vibration which adversely affects animals through disturbance rather than plants and the physical substrates they grow in.

7.8.17. Thus, the following features will not be affected by noise and vibration:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR.

- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland);
  - Coastal and floodplain grazing marsh;
  - Intertidal mudflats; and
  - Coastal saltmarsh (adjacent to the Site Boundary).
- Other Terrestrial Habitats:
  - River habitat;
  - Modified grassland;
  - Reedbeds;
  - Other neutral grassland;
  - Mixed scrub;
  - Open mosaic habitat; and
  - Standing water.
- Protected/notable species:
  - Notable plants;
  - Aquatic macroinvertebrates;
  - Macrophytes; and
  - Invasive species.

7.8.18. Noise and vibration impacts will affect animal species using designated sites and other habitats within and surrounding the Proposed Scheme. Construction of the Proposed Scheme, including vessel movements associated with construction of the Proposed Jetty, will produce noise and vibration over and above that which already exists within the Site due to existing industrial land uses (whether or not this were to include Riverside 2 construction), however, effects will be ameliorated due to these existing sources of noise and vibration.

7.8.19. Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC are all important at the County level. The magnitude of change is low given the baseline noise environment and measures to avoid excessive noise that will be included within the OCoCP. Therefore, there is likely to be a direct, temporary, medium term **moderate adverse (significant)** effect on all four designated sites.

7.8.20. Disturbance of Thames-side habitats for construction of the Proposed Jetty (including vessel movements), and terrestrial parts of the Site will affect foraging resources used by wintering birds. Wintering birds are important at the County level. The magnitude of change is low given the baseline noise environment and measures to avoid excessive noise that will be included within the OCoCP. Therefore, there is likely to be a direct, temporary, medium term **moderate adverse** (**significant**) effect on wintering birds.

7.8.21. Surveys are on-going for remaining ecological features for which the impact is relevant, preventing the assessment of impacts and their significance. However, the following assumptions are reasonable given the level of detail available:

- Bats: direct, temporary, medium term effect through disturbance to foraging and commuting areas within Crossness LNR and associated habitats.
- Breeding birds: direct, temporary, medium term effect through disturbance to nesting and foraging areas within Crossness LNR and associated habitats.
- Reptiles: direct, temporary, medium term effect through disturbance to grassland and scrub habitat supporting reptiles.
- Terrestrial macroinvertebrates: direct, temporary, medium term effect through disturbance to supporting habitat.
- Water voles: direct, temporary, medium term effect through disturbance to ditches supporting this species.
- Freshwater fish: direct, temporary, medium term effect through disturbance to ditches supporting these species.

Dust

7.8.22. The effects of dust produced during construction will be limited to the Site and its immediate surroundings and would not be transmitted at distance further than the Proposed Scheme's local area. This has been defined using dispersion modelling work undertaken to support the analysis in **Chapter 5: Air Quality (Volume 1**), where a maximum distance band of 50m has been used for effects on dust on ecological features. Thus, 'local area' can be defined by the 50m dispersion band. Thus, following ecological features outside this will not be affected by dust:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR.
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.

7.8.23. Degradation of habitat, and the loss of that habitat's function to species it supports would be the effect of deposition of dust released during the construction phase. Dust would cause an effect in the local area around the Proposed Scheme through smothering of vegetation, changed soil conditions, transmission of polluting substances and irritation of animal species. Although dust is currently raised by operational facilities such as Riverside 1 and its associated traffic, measures associated with these facilities keep it under control.

7.8.24. However, dust suppression measures, such as water sprays, will be used during construction as part of embedded mitigation defined within the OCoCP. These will control dust release and degradation of habitats, and consequent effects on species they support.

7.8.25. Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC are all important at the County level. With dust suppression measures that will be included in the OCoCP, the magnitude of change will be negligible. Therefore, there is likely to be a direct, temporary, medium term **negligible adverse (not significant)** effect on all four designated sites.

7.8.26. HPI (deciduous woodland, Coastal and floodplain grazing marsh, intertidal mudflats coastal saltmarsh) adjacent to the Site Boundary are important at the County level. With dust suppression measures that will be included in the OCoCP, the magnitude of change will be negligible. Therefore, there is likely to be a direct, temporary, medium term **negligible adverse (not significant)** effect on HPI.

7.8.27. River habitat within the Thames is important at the County level. With dust suppression measures that will be included in the OCoCP, the magnitude of change will be negligible. Therefore, there is likely to be a direct, temporary, medium term **negligible adverse (not significant)** effect on river habitat. Remaining habitats (open mosaic habitat, modified grassland, reedbeds, other neutral grassland, mixed scrub and standing water) are important at the Local level. With dust suppression measures that will be included in the OCoCP, the magnitude of change will be negligible. Therefore, there is likely to be a direct, temporary, medium term **negligible adverse (not significant)** effect on other habitats.

7.8.28. Dust deposition and degradation of both Thames-side habitats and terrestrial parts of the Site would affect foraging resources used by wintering birds (important at the County level). With dust suppression measures that will be included in the OCoCP, the magnitude of change will be negligible. Therefore, there is likely to be a direct, temporary, medium term **negligible adverse (not significant)** effect on wintering birds.

7.8.29. Surveys are on-going for remaining ecological features for which the impact is relevant (bats, breeding birds, reptiles, notable plants and invasive species, terrestrial invertebrates, water voles, freshwater fish, aquatic macroinvertebrates and aquatic macrophytes). With dust suppression measures that will be included in the OCoCP, the magnitude of change for all these features will be negligible. Therefore, they will be subject to a direct, temporary, medium term **negligible adverse (not significant)** effect as a result of construction phase dust.

Surface Water Run-off

7.8.30. The effects of surface water run-off during construction will be limited to the Site and areas hydrologically connected (through run-off, the drainage network or ground water) to it, and would not be transmitted upstream or to areas without a hydrological connection to the Site. Effects would extend to non-aquatic habitats within the Site. The following ecological features fall into these categories and will not be affected by surface water run-off:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR.
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland).
- Other Terrestrial Habitats:
  - Modified grassland;
  - Reedbeds;
  - Other neutral grassland;
  - Mixed scrub; and
  - Open mosaic habitat.

7.8.31. Run-off from the Proposed Scheme would enter the drainage ditch network within the Site and eventually the River Thames. This presents a possible vector for sediment and chemical pollution that may affect water quality, and salts that may change the salinity of water in which plants and animals live. The build-up of sediments and pollutants may occur within the drainage network and/or ground water, adversely altering key conditions for habitats and species.

7.8.32. Crossness LNR, Erith Marshes MSINC and Belvedere Dykes SINC are hydrologically linked to the Proposed Scheme, and all are important at the County level. The magnitude of change is medium. Therefore, there is likely to be an indirect, temporary, medium term **moderate adverse (significant)** effect on all three designated sites.

7.8.33. HPI (Coastal and floodplain grazing marsh, intertidal mudflats and coastal saltmarsh) adjacent to the Site Boundary are hydrologically linked (by run-off, the ditch network and ground water) to the Proposed Scheme and are important at the County level. The magnitude of change is medium. Therefore, there is likely to be an indirect, temporary, medium term **moderate adverse (significant)** effect on HPI.

7.8.34. River Thames and Tidal Tributaries MSINC and its river habitat will be the ultimate destination for run-off from the Proposed Scheme during construction. It is important at the County level. Due to dilution effects within the River Thames, the magnitude of change is low. Therefore, there is likely to be an indirect, temporary, medium term **moderate adverse (significant)** effect on River Thames and Tidal Tributaries MSINC and river habitat. Remaining habitats that are hydrologically linked (by run-off, the ditch network and ground water) to the Proposed Scheme (reedbeds and standing water) are important at the Local level. The magnitude of change is medium. Therefore, there is likely to be an indirect, temporary, medium term **minor adverse (not significant)** effect on other habitats.

7.8.35. Degradation of Thames-side habitats, and wetlands in terrestrial parts of the Site, could occur through contaminated run-off and would affect foraging resources used by wintering birds. Wintering birds are important at the County level. The magnitude of change is medium. Therefore, there is likely to be an indirect, temporary, medium term **moderate adverse** (**significant**) effect on wintering birds.

7.8.36. Surveys are on-going for remaining ecological features for which the impact is relevant, preventing the assessment of impacts and their significance. However, the following assumptions are reasonable given the level of detail available:

- Bats: indirect, temporary, medium term effect through degradation of foraging and commuting areas within Crossness LNR and associated habitats.
- Breeding birds: indirect, temporary, medium term effect through degradation of nesting and foraging areas within Crossness LNR and associated habitats.
- Reptiles: indirect, temporary, medium term effect through degradation of grassland and scrub habitat supporting reptiles.
- Terrestrial invertebrates: indirect, temporary, medium term effect through degradation of supporting habitat.
- Water voles: indirect, temporary, medium term effect through degradation of ditch habitat supporting this species.
- Aquatic macroinvertebrates: direct, temporary, medium term effect through degradation of ditch habitat supporting these species.
- Freshwater Fish: direct, temporary, medium term effect through degradation of ditch habitat supporting these species.

- Macrophytes: direct, temporary, medium term effect through degradation of supporting habitat.

7.8.37. It is not possible at this stage to give a preliminary assessment of impacts of surface water run-off on notable plants and invasive species as surveys have not been completed and data analysed. This will be presented in the ES.

Lighting

7.8.38. Lighting produced during construction would be focussed on works areas within the Site but light spill from these areas could affect adjacent designated sites (Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal MSINC), habitats within the Site but outside works areas, and species associated with both.

7.8.39. Light spill would not affect distant designated sites and habitats, it being blocked by intervening development and ameliorated by distance. In addition, habitats are not considered to be sensitive to lighting, which adversely affects animals through disturbance rather than plants and the physical substrates they grow in. Thus, the following features will not be affected by lighting:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR.
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland);
  - Coastal and floodplain grazing marsh;
  - Intertidal mudflats; and
  - Coastal saltmarsh (adjacent to the Site Boundary).
- Other Terrestrial Habitats:
  - River habitat;
  - Modified grassland;
  - Reedbeds;
  - Other neutral grassland;

  - Mixed scrub;
  - Open mosaic habitat; and
  - Standing water.
- Protected/notable species:
  - Notable plants; and
  - Invasive species.

7.8.40. Species that use habitats within designated sites and other habitats within the Site may be disturbed from construction phase flood lighting, preventing them using certain areas or affecting their ability to feed, breed or undertake important ecological functions in their life cycle. However, areas within and surrounding the Proposed Scheme are already subject to external lighting due to its industrialised nature.

7.8.41. Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC are all important at the County level. The magnitude of change is low given the existing baseline environment. Therefore, there is likely to be an indirect, temporary, medium term **moderate adverse (significant)** effect on all four designated sites.

7.8.42. Lighting disturbance of Thames-side habitats for construction of the Proposed Jetty, and terrestrial parts of the Site will affect foraging resources used by wintering birds. Wintering birds are important at the County level. The magnitude of change is low given the existing baseline environment. Therefore, there is likely to be an indirect, temporary, medium term **moderate adverse (significant)** effect on wintering birds.

7.8.43. Surveys are on-going for remaining ecological features for which the impact is relevant, preventing the assessment of impacts and their significance. However, the following assumptions are reasonable given the level of detail available:

- Bats: indirect, temporary, medium term effect through disturbance to foraging and commuting areas within Crossness LNR and associated habitats.
- Breeding birds: indirect, temporary, medium term effect through disturbance to nesting and foraging areas within Crossness LNR and associated habitats.
- Water voles: indirect, temporary, medium term effect through disturbance to ditches supporting this species.
- Reptiles: indirect, temporary, medium term effect through disturbance to grassland and scrub habitat supporting reptiles.
- Terrestrial invertebrates: indirect, temporary, medium term effect through disturbance to supporting habitat.
- Aquatic macroinvertebrates: direct, temporary, medium term effect through changes in feeding, breeding and movement within ditches that support these species.
- Freshwater Fish: direct, temporary, medium term effect through changes to migration, spawning and behaviour.
- Macrophytes: direct, temporary, medium term effects through changes to photoperiod.

Changes in Air Quality

7.8.44. During construction, air quality may be affected by increased road traffic on the local road network and increased vessel movements on the River Thames, which in turn would affect ambient pollutant levels. These movements will be concentrated along Norman Road and roads within southeast London that link to the wider strategic road network, including the A2016, A253, A206 and A2000 (that define the Study Area for **Chapter 18: Landside Transportation (Volume 1)**), away from the majority of the designated sites within the Proposed Scheme's ZOI. **Chapter 5: Air Quality (Volume 1)** demonstrates that emissions from vehicles and plant associated with the construction phase will be in the areas immediately adjacent to the Site. In addition, non-aquatic animal species are not considered sensitive to changes in air quality, but aquatic animals could be affected by flux of pollutants from air to water. Thus, the following features will not be affected by changes in air quality during the construction stage:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR.
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- Protected/notable species:
  - Bats;
  - Breeding birds;
  - Reptiles;
  - Terrestrial invertebrates;
  - Water vole; and
  - Wintering birds.

7.8.45. Analysis of construction phase emissions will be undertaken in the ES, with the approach and modelling to be undertaken described in **Chapter 5: Air Quality (Volume 1)**. To account for the deficit in modelling data, a precautionary approach to assessment has been adopted at this stage.

7.8.46. Emissions from Proposed Scheme construction vehicles, including vessels on the River Thames, and equipment would lead to deposition of nitrogen compounds as a result of exhausts during the construction phase including nitrogen dioxide and nitrate, as well as acids including ammonia and organic compounds. These would lead to degradation of habitats through nutrient enrichment and pollution. However, background levels of air pollution in the industrialised area of Belvedere are relatively high already affecting terrestrial and aquatic habitats, and thus the magnitude of change would be low.

7.8.47. Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC are all important at the County level. The magnitude of change is low. Therefore, there is likely to be an indirect, temporary, medium term **moderate adverse (significant)** effect on all four designated sites.

7.8.48. HPI (deciduous woodland, Coastal and floodplain grazing marsh, intertidal mudflats and coastal saltmarsh) adjacent to the Site Boundary are important at the County level. The magnitude of change is low. Therefore, there is likely to be an indirect, temporary, medium term **moderate adverse (significant)** effect on HPI.

7.8.49. River habitat within the Thames is important at the County level. The magnitude of change is low. Therefore, there is likely to be an indirect, temporary, medium term **moderate adverse** (**significant**) effect on river habitat.

7.8.50. Remaining habitats (open mosaic habitat, modified grassland, reedbeds, other neutral grassland, mixed scrub and standing water) are important at the Local level. The magnitude of change is low. Therefore, there is likely to be an indirect, temporary, medium term **minor adverse (not significant)** effect on other habitats.

7.8.51. Aquatic species (freshwater fish and aquatic macroinvertebrates) in the area local to the Proposed Scheme may also receive effects of air quality changes. This could include changes to water quality parameters through deposition of nitrogen compounds, ammonia and other polluting gases. This has the potential to result in increased eutrophication in watercourses.

7.8.52. Freshwater fish species present within the Site Boundary are important at an International level due to the potential presence of European eel. The magnitude of change is low. Therefore, there is likely to be an indirect, temporary, medium term, **moderate adverse** (**significant**) effect on European eel.

7.8.53. The aquatic macroinvertebrate species present within the Site Boundary are important on a National level due to the presence of several notable and Red Book macroinvertebrate species. The magnitude of the change is low. Therefore, there is likely to be an indirect, temporary, medium term, **moderate adverse** (**significant**) effect on the macroinvertebrate community.

7.8.54. The macrophyte community within the Site Boundary is important at a Local level based upon the community present. The magnitude of change is low. Therefore, there is likely to be an indirect, temporary, medium term **negligible** (**not significant**) effect on the macrophyte community.

7.8.55. It is not possible at this stage to give a preliminary assessment of impacts of changes in air quality on notable plants and invasive species as surveys have not been completed and data analysed. This will be presented in the ES.

Shading

7.8.56. The effects of shading from buildings will be greatest at the operation phase; however, there is potential for localised shading during construction of structures and equipment. This would be limited to be adjacent to building footprints within the Site and its immediate surroundings and will not affect distant ecological features or those some distance from construction activities. In addition, shading would not affect Thames-side ecological features as no vegetation is present within the Site in aquatic habitat beyond the river wall. Thus, the following features will not be affected by shading:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR.
- Non-statutory Designated Sites:
  - River Thames and Tidal Tributaries MSINC; and
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland);
  - Coastal saltmarsh (adjacent to the Site Boundary); and
  - Intertidal mudflats.
- Other Terrestrial Habitats:
  - River habitat.

7.8.57. Although primarily an operation phase consideration (i.e., resulting from completed buildings and structures), shading could also affect ecological features during the construction phase. As structures such as storage tanks, flue-gas transfer pipework and buildings are completed, they will shade habitats in the area within and in the immediate surrounds of the Proposed Scheme. To a limited extent, equipment used during construction will also contribute to shading but the mobility of vehicles and cranes would be temporary and low-level. The extent of shading is not currently known and will be the subject of modelling that will be presented in the ES.

7.8.58. Crossness LNR, Erith Marshes MSINC and Belvedere Dykes SINC either overlap or are close to the footprint of buildings to be constructed for the Proposed Scheme, and all are important at the County level. The magnitude of change is currently unknown. Therefore, there is likely to be a direct, temporary, medium term effect on all four designated sites, but it has not been possible to determine whether this will be significant at this stage.

7.8.59. Coastal and floodplain grazing marsh HPI is found close to the footprint of buildings to be constructed for the Proposed Scheme and is important at the County level. The magnitude of change is currently unknown. Therefore, there is likely to be a direct, temporary, medium term effect on Coastal and floodplain grazing marsh HPI, but it has not been possible to determine whether this will be significant at this stage.

7.8.60. Habitats that could be shaded as a result of the Proposed Scheme are important at the Local level. The magnitude of change is currently unknown. Therefore, there is likely to be a direct, temporary, medium term effect on other habitats, but it has not been possible to determine whether this will be significant at this stage.

7.8.61. Degradation of wetlands in terrestrial parts of the Site through shading will affect foraging resources used by wintering birds. Wintering birds are important at the County level. The magnitude of change is currently unknown. Therefore, there is likely to be a direct, temporary, medium term effect on wintering birds, but it has not been possible to determine whether this will be significant at this stage.

7.8.62. Surveys are on-going for remaining ecological features for which the impact is relevant, preventing the assessment of impacts and their significance. However, the following assumptions are reasonable given the level of detail available:

- Bats: direct, temporary, medium term effect through degradation of foraging and commuting areas within Crossness LNR and associated habitats.
- Breeding birds: direct, temporary, medium term effect through degradation of nesting and foraging areas within Crossness LNR and associated habitats.
- Reptiles: direct, temporary, medium term effect through degradation of grassland and scrub habitat supporting reptiles.
- Terrestrial invertebrates: direct, temporary, medium term effect through degradation of supporting habitat.
- Water voles: direct, temporary, medium term effect through degradation of ditch habitat supporting this species.
- Aquatic macroinvertebrates: indirect, temporary, medium term effect through degradation of ditch habitat supporting this species.
- Freshwater fish: indirect, temporary, medium term effect through degradation of ditch habitat supporting these species.
- Macrophytes: direct, temporary, medium term effect through degradation of ditch habitat supporting these species, as well as direct impacts through shading itself.

7.8.63. It is not possible at this stage to give a preliminary assessment of impacts of shading on notable plants and invasive species as surveys have not been completed and data analysed. This will be presented in the ES.

OPERATION PHASE

7.8.64. The likely significant effects for terrestrial biodiversity associated with the operational phase are set out below.

Noise and Vibration

7.8.65. The effects of noise and vibration during operation would arise as a result of automated equipment. Modelling work undertaken to inform the assessment in **Chapter 6: Noise and Vibration (Volume 1)** has analysed likely changes in noise and vibration during operation at five locations in the area surrounding the Proposed Scheme, at distances between approximately 70m and 600m from the Site Boundary. Although the approach used is focussed on effects on human receptors, it predicts operational phase noise and vibration would be of negligible magnitude during the daytime but of moderate magnitude at night at the closest locations. However, this is significantly attenuated over distance and through screening by industrial, commercial and residential limiting the transmission of effects. It is therefore reasonable to conclude noise and vibration will only affect ecological features found within and adjacent to the Site Boundary (its 'local area').

7.8.66. In addition, habitats are not considered to be sensitive to noise and vibration, which adversely affects animals through disturbance rather than plants and the physical substrates they grow in. Thus, the following features will not be affected by noise and vibration:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR.
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland);
  - Coastal and floodplain grazing marsh;
  - Intertidal mudflats;
  - and Coastal saltmarsh (adjacent to the Site Boundary).

- Other Terrestrial Habitats:
  - River habitat;
  - Open mosaic habitat,
  - Modified grassland;
  - Reedbeds;
  - Other neutral grassland;
  - Mixed scrub; and
  - Standing water.
- Protected/notable species:
  - Notable plants;
  - Aquatic macroinvertebrates;
  - Macrophytes; and
  - Invasive species.

7.8.67. Operational noise and vibration coming from the Proposed Scheme, including vessel movements to and from the Proposed Jetty, will affect animal species using designated sites and other habitats within and surrounding the Site. Operation of the Proposed Scheme will produce noise and vibration over and above that which already exists at the Site, even recognising its industrial land use; however, effects will be ameliorated due to these existing sources of noise and vibration. Wider consideration of the likely significant effects of the Proposed Scheme on noise and vibration are presented in **Chapter 6: Noise and Vibration (Volume 1)**.

7.8.68. Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC are all important at the County level. The magnitude of change is low with measures to control operational noise included within the OEMP, which will be prepared prior to the Proposed Scheme commencing operation. Therefore, there is likely to be a direct, permanent, long term **moderate adverse (significant)** effect on all four designated sites.

7.8.69. Disturbance of Thames-side habitats as a result of the use of the Proposed Jetty, and wetland in terrestrial parts of the Site will affect foraging resources used by wintering birds. Wintering birds are important at the County level. The magnitude of change is low with measures to control operational noise included within the OEMP. Therefore, there is likely to be a direct, permanent, long term **moderate adverse** (**significant**) effect on wintering birds.

7.8.70. Surveys are on-going for remaining ecological features for which the impact is relevant, preventing the assessment of impacts and their significance. However, the following assumptions are reasonable given the level of detail available:

- Bats: direct, permanent, long term effect through disturbance to foraging and commuting areas within Crossness LNR and associated habitats.
- Breeding birds: direct, permanent, long term effect through disturbance to nesting and foraging areas within Crossness LNR and associated habitats.

- Reptiles: direct, permanent, long term effect through disturbance to grassland and scrub habitat supporting reptiles.
- Terrestrial invertebrates: direct, permanent, long term effect through disturbance to supporting habitat.
- Water voles: direct, permanent, long term effect through disturbance to ditches supporting this species.
- Freshwater Fish: direct, temporary, medium term effect through displacement of individuals.

Maintenance Activities

7.8.71. In addition to operational noise and vibration, disturbance of ecological features may arise from the presence of workers inspecting and repairing equipment installed for the Proposed Scheme. This disturbance would be infrequent, occurring only when scheduled maintenance activities were required. Disturbance would result from noise, vibration and visual disturbance produced by maintenance activities.

7.8.72. Effects of maintenance activities will be limited to the Site and its immediate surroundings and would not be transmitted at distance further than the Proposed Scheme's local area. In addition, habitats are not considered to be sensitive to the visual and noise disturbance that would adversely affects sensitive animals (mammals, birds), rather than plants and the physical substrates they grow in. Thus, the following features will not be affected by maintenance activities:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR.
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland);
  - Coastal and floodplain grazing marsh; and
  - Intertidal mudflats and Coastal saltmarsh (adjacent to the Site Boundary).
- Other Terrestrial Habitats:
  - River habitat;
  - Open mosaic habitat;

  - Modified grassland;
  - Reedbeds;
  - Other neutral grassland;
  - Mixed scrub; and
  - Standing water.
- Protected/notable species:
  - Notable plants and invasive species;
  - Reptiles;
  - Terrestrial invertebrates;
  - Freshwater fish;
  - Aquatic macroinvertebrates; and
  - Macrophytes.

7.8.73. Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC are all important at the County level. The magnitude of change is low, with measures to control operational noise included within the OEMP. Therefore, there is likely to be an indirect, permanent, long term **moderate adverse (significant)** effect on all four designated sites.

7.8.74. Disturbance as a result of maintenance activities will affect foraging resources used by wintering birds. Wintering birds are important at the County level. The magnitude of change is low with measures to control operational noise included within the OEMP. Therefore, there is likely to be an indirect, permanent, long term **moderate adverse (significant)** effect on wintering birds.

7.8.75. Surveys are on-going for remaining ecological features for which the impact is relevant, preventing the assessment of impacts and their significance. However, the following assumptions are reasonable given the level of detail available:

- Bats: indirect, permanent, long term effect through disturbance to foraging and commuting areas within Crossness LNR and associated habitats.
- Breeding birds: indirect, permanent, long term effect through disturbance to nesting and foraging areas within Crossness LNR and associated habitats.
- Water voles: indirect, permanent, long term effect through disturbance to ditches supporting this species.

Surface Water Run-off

7.8.76. The effects of surface water run-off from the operational Proposed Scheme will be limited to the Site and areas hydrologically connected (through run-off, the drainage network or ground water) to it, and would not be transmitted upstream or to areas without a hydrological connection to the Site. Effects would extend to non-aquatic habitats within the Site. The following ecological features fall into these categories and will not be affected by surface water run-off:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR.
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland).
- Other Terrestrial Habitats:
  - Open mosaic habitat;
  - Modified grassland;
  - Reedbeds;
  - Other neutral grassland; and
  - Mixed scrub.

7.8.77. Run-off from the operational Proposed Scheme would enter the drainage ditch network within the Site and eventually the River Thames. This presents a possible vector for sediment and chemical pollution from stored materials, waste and spillages that may affect water quality, and salts that may change the salinity of water in which plants and animals live. The build up of sediments and pollutants may occur within the drainage network and/or ground water, adversely altering key conditions for habitats and species.

7.8.78. Crossness LNR, Erith Marshes MSINC and Belvedere Dykes SINC are hydrologically linked to the Proposed Scheme, and all are important at the County level. The magnitude of change is medium. Therefore, there is likely to be an indirect, permanent, long term **moderate adverse (significant)** effect on all three designated sites.

7.8.79. HPI (Coastal and floodplain grazing marsh, intertidal mudflats and coastal saltmarsh) adjacent to the Site Boundary are hydrologically linked to the Proposed Scheme and are important at the County level. The magnitude of change is medium. Therefore, there is likely to be an indirect, permanent, long term **moderate adverse (significant)** effect on HPI.

7.8.80. River Thames and Tidal Tributaries MSINC and its associated river habitat is the ultimate destination for run-off from the Proposed Scheme during operation, is important at the County level. Due to dilution effects in the River Thames, the magnitude of change is low. Therefore, there is likely to be an indirect, temporary, medium term **moderate adverse (significant)** effect on River Thames and Tidal Tributaries MSINC and river habitat. Remaining habitats that are hydrologically linked to the Proposed Scheme (reedbeds and standing water) are important at the Local level. The magnitude of change is medium. Therefore, there is likely to be an indirect, permanent, long term **minor adverse (not significant)** effect on other habitats.

7.8.81. Degradation of Thames-side habitats and wetlands in terrestrial parts of the Site through contaminated run-off will affect foraging resources used by wintering birds. Wintering birds are important at the County level. The magnitude of change is medium. Therefore, there is likely to be an indirect, permanent, long term **moderate adverse (significant)** effect on wintering birds.

7.8.82. Surveys are on-going for remaining ecological features for which the impact is relevant, preventing the assessment of impacts and their significance. However, the following assumptions are reasonable given the level of detail available:

- Bats: indirect, permanent, long term effect through degradation of foraging and commuting areas within Crossness LNR and associated habitats.
- Breeding birds: indirect, permanent, long term effect through degradation of nesting and foraging areas within Crossness LNR and associated habitats.
- Reptiles: indirect, permanent, long term effect through degradation of grassland and scrub habitat supporting reptiles.
- Terrestrial invertebrates: indirect, permanent, long term effect through degradation of supporting habitat.
- Water voles: indirect, permanent, long term effect through degradation of ditch habitat supporting this species.
- Aquatic macroinvertebrates: direct, temporary, medium term effect through pollution causing changes to water quality on which these species depend.
- Freshwater fish: direct, temporary, medium term effect through changes to water quality resulting in fish mortality and degradation of ditch habitat supporting these species.
- Macrophytes: direct, temporary, medium term effect through impact on water quality leading die-off and degradation of ditch habitat supporting these species.

7.8.83. It is not possible at this stage to give a preliminary assessment of impacts of surface water run-off on notable plants and invasive species as surveys have not been completed and data analysed. This will be presented in the ES.

Lighting

7.8.84. Lighting produced during operation would be focussed on works areas within the Site but light spill from these areas could affect adjacent designated sites (Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal MSINC), habitats within the Site but outside works areas, and species associated with both.

7.8.85. Light spill would not affect distant designated sites and habitats, it being blocked by intervening development and ameliorated by distance. In addition, habitats are not considered to be sensitive to lighting, which adversely affects animals through disturbance rather than plants and the physical substrates they grow in. Thus, the following features will not be affected by lighting:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR.
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland);
  - Coastal and floodplain grazing marsh;
  - Intertidal mudflats; and
  - Coastal saltmarsh (adjacent to the Site Boundary).
- Other Terrestrial Habitats:
  - River habitat;
  - Open mosaic habitat;
  - Modified grassland;
  - Reedbeds;
  - Other neutral grassland;
  - Mixed scrub; and
  - Standing water.
- Protected/notable species:
  - Notable plants; and
  - Invasive species.

7.8.86. During operation, species that use habitats within designated sites, and habitats both within and adjacent to the Proposed Scheme, may be disturbed from flood lighting or other forms of illumination, preventing them using certain areas or affecting their ability to feed, breed or undertake important ecological functions in their life cycle. However, areas within and surrounding the Proposed Scheme are already subject to external lighting due to its industrialised nature.

7.8.87. Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC are all important at the County level. The magnitude of change is low. Therefore, there is likely to be an indirect, permanent, long term **moderate adverse (significant)** effect on all four designated sites.

7.8.88. Lighting disturbance of Thames-side habitats for operation of the Proposed Jetty, and terrestrial parts of the Site will affect foraging resources used by wintering birds. Wintering birds are important at the County level. The magnitude of change is low. Therefore, there is likely to be an indirect, permanent, long term **moderate adverse (significant)** effect on wintering birds.

7.8.89. Surveys are on-going for remaining ecological features for which the impact is relevant, preventing the assessment of impacts and their significance. However, the following assumptions are reasonable given the level of detail available:

- Bats: indirect, permanent, long term effect through disturbance to foraging and commuting areas within Crossness LNR and associated habitats.
- Breeding birds: indirect, permanent, long term effect through disturbance to nesting and foraging areas within Crossness LNR and associated habitats.
- Reptiles: indirect, permanent, long term effect through disturbance to grassland and scrub habitat supporting reptiles.
- Terrestrial invertebrates: indirect, permanent, long term effect through disturbance to supporting habitat.
- Water voles: indirect, permanent, long term effect through disturbance to ditches supporting this species.
- Aquatic macroinvertebrates: indirect, permanent, long term effect through disturbance to supporting habitat.
- Fish: direct, permanent, long term effect through displacement and disruption of normal behaviour.
- Macrophytes, permanent, long term effect through changes to photoperiod and potential increased grazing by herbivorous species.

Changes in Air Quality

7.8.90. Analysis of operation phase emissions for designated sites has been undertaken with the approach and modelling undertaken as described in **Chapter 5: Air Quality (Volume 1**).

7.8.91. Characteristics of the emissions plumes released from the Riverside Campus (at the time of writing, construction works for Riverside 2 are being undertaken) will change when the Proposed Scheme is operational. Changes can spread some distance from the Proposed Scheme and ecological features in a wide ZOI have been assessed for effects changes in airborne ammonia, nitrogen oxides, sulphur dioxides, and for the deposition of nitrogen and acid. Following the approach adopted in **Chapter 5 Air Quality (Volume 1)**, which uses criteria from Environment Agency guidance[62], where the percentage change in concentration of these pollutants is <1% (rounded to 1dp), the change is described as 'negligible' regardless of the concentration.

7.8.92. The following designated sites fall below the concentration threshold for all five pollutants modelled:

- Epping Forest SAC;
- Oxleas Woodlands SSSI;
- West Thurrock Lagoon and Marshes SSSI;
- Ruxley Gravel Pits SSSI; and
- Lesnes Abbey Wood LNR.

7.8.93. Whilst aquatic animals could be affected by flux of pollutants from air to water, non-aquatic animal species are not considered sensitive to changes in air quality. Consequently, the following features will not be affected by changes in air quality during the operation stage:

- Protected/notable species:
  - Bats;
  - Breeding birds;
  - Reptiles;
  - Terrestrial invertebrates;
  - Water vole; and
  - Wintering birds.

7.8.94. The operational Proposed Scheme would not lead to changes in local road traffic patterns. However, two sources of air quality change would comprise:

- increase in vessel movement frequency; and
- changes in characteristics of the emissions plumes released from the Riverside Campus following the installation of the Carbon Capture Facility.

7.8.95. Vessel movements would lead to changes in air quality in the local area only, whereas changes in emissions plume characteristics would be transmitted both locally and at distance. Changes in air quality could lead to degradation of habitats through nutrient enrichment and pollution. However, background levels of air pollution in the industrialised area of Belvedere are relatively high already affecting terrestrial and aquatic habitats. Modelling work has taken into account background levels of air pollution.

7.8.96. Modelling detailed in **Chapter 5: Air Quality (Volume 1)** indicates changes to the emissions arising from the Riverside Campus following the installation of the Carbon Capture Facility may be transmitted to, and/or affect disposition levels for designated sites and habitats. These comprise:

- Inner Thames Marshes SSSI and Ingrebourne Marshes SSSI, both important at the National level. Above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition are predicted by modelling at these sites. However, increases above the threshold are relatively small and thus the magnitude of change is low. Therefore, there is likely to be an indirect, permanent, long term **potentially up to moderate adverse (significant)** effect on Inner Thames Marshes SSSI and Ingrebourne Marshes SSSI.
- Crossness LNR and Rainham Marshes LNR, both important at the County level. Above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition are predicted by modelling at these sites. However, increases above the threshold are relatively small and thus the magnitude of change is low. Therefore, there is likely to be an indirect, permanent, long term **potentially up to moderate adverse (significant)** effect on Crossness LNR and Rainham Marshes LNR.

7.8.97. Modelling of effects on further ecological features has not been undertaken at this stage, but the following conclusions can be drawn:

- Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC, important at the County level, are coincident or adjacent to Crossness LNR. Therefore it is reasonable to assume that above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition will occur at these sites, but that such increases would be small and the magnitude of change low. Therefore, there is likely to be an indirect, permanent, long term **potentially up to moderate adverse (significant)** effect on Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC.
- 18 further SINC outside the Site are all important at the County level. Modelling work for each site has not been completed, but a conservative estimate of the magnitude of change would be that it is low. Therefore, an indirect, permanent, long term **potentially up to moderate adverse (significant)** effect on these designated sites is possible.
- HPI (deciduous woodland, coastal and floodplain grazing marsh, intertidal mudflats and coastal saltmarsh) adjacent to the Site Boundary are important at the County level, and coincident or adjacent to Crossness LNR. Therefore, it is reasonable to assume that above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition will occur at these sites, but that such increases would be small and the magnitude of change low. Therefore, there is likely to be an indirect, permanent, long term **potentially up to moderate adverse (significant)** effect on HPI.

- River habitat within the Thames is important at the County level and is adjacent to Crossness LNR. Therefore, it is reasonable to assume that above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition will occur within the Thames, but that such increases would be small and the magnitude of change low. Therefore, an indirect, permanent, long term **potentially up to moderate adverse (significant)** effect on river habitat is possible.
- Remaining habitats (open mosaic habitat, modified grassland, reedbeds, other neutral grassland, mixed scrub and standing water) are important at the Local level and are adjacent to Crossness LNR. Therefore, it is reasonable to assume that above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition will occur in these habitats, but that such increases would be small and the magnitude of change low. Therefore, there is likely to be an indirect, permanent, long term **negligible (not significant)** effect on other habitats.

7.8.98. Aquatic species (freshwater fish and aquatic macroinvertebrates) in the area local to the Proposed Scheme may also receive effects of air quality changes arising from changes to the emissions arising from the Riverside Campus following the installation of the Carbon Capture Facility:

- Freshwater fish species present within the Site are important at an International level due to the potential presence of European eel. Modelling indicates Crossness LNR, which is within the Site, will receive above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition, but that such increases would be small and the magnitude of change low. Therefore, there is likely to be an indirect, permanent, long term **potentially up to moderate adverse (significant)** effect on European eel.
- The aquatic macroinvertebrate species present within the Site are important on a National level to the presence of several notable and Red Book macroinvertebrate species. Modelling indicates Crossness LNR, which is within the Site, will receive above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition, but that such increases would be small and the magnitude of change low. Therefore, there is likely to be an indirect, permanent, long term **potentially up to moderate adverse (significant)** effect on the macroinvertebrate community.
- The macrophyte community within the Site is important at a Local level based upon the community present. Modelling indicates Crossness LNR, which is within the Site, will receive above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition, but that such increases would be small and the magnitude of change low. Therefore, there is likely to be an indirect, permanent, long term **negligible** (**not significant**) effect on the macrophyte community.

7.8.99. It is not possible at this stage to give a preliminary assessment of impacts of changes in air quality on notable plants and invasive species as surveys have not been completed and data analysed. This will be presented in the ES.

Shading

7.8.100. The effects of shading from buildings will be greatest during operation of the Proposed Scheme, which are permanent, as opposed to the transient shading effects during construction. However, operational phase shading will be localised to areas close to building footprints within the Site and its immediate surroundings and will not affect distant ecological features or those some distance away. In addition, shading would not affect Thames-side ecological features as no vegetation is present in aquatic habitat beyond the river wall within the Site. Thus, the following features will not be affected by shading:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR.
- Non-statutory Designated Sites:
  - River Thames and Tidal Tributaries MSINC; and
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland);
  - Intertidal mudflat; and
  - Coastal saltmarsh (adjacent to the Site Boundary).
- Other Terrestrial Habitats:
  - River habitat.

7.8.101. Structures such as storage tanks, flue-gas transfer pipework and buildings will shade habitats in the area within and in the immediate surrounds of the Proposed Scheme during its operation. This reduction in light availability may lead to degradation of habitats and consequent effects on species they support. The extent of shading is not currently known and will be the subject of modelling which will be presented in the ES.

7.8.102. Crossness LNR, Erith Marshes MSINC and Belvedere Dykes SINC either overlap or are close to the footprint of buildings to be constructed for the Proposed Scheme, and all are important at the County level. The magnitude of change is currently unknown. Therefore, there is likely to be a direct, permanent, long term effect on all four designated sites, but it has not been possible to determine whether this will be significant at this stage.

7.8.103. Coastal and floodplain grazing marsh HPI either overlaps or is close to the footprint of buildings to be constructed for the Proposed Scheme and is important at the County level. The magnitude of change is currently unknown. Therefore, there is likely to be a direct, permanent, long term effect on coastal and floodplain grazing marsh HPI, but it has not been possible to determine whether this will be significant at this stage.

7.8.104. Terrestrial habitats that could be shaded as a result of the Proposed Scheme are important at the Local level. The magnitude of change is currently unknown. Therefore, there is likely to be a direct, permanent, long term effect on other habitats, but it has not been possible to determine whether this will be significant at this stage.

7.8.105. Degradation of wetlands in terrestrial parts of the Site through shading will affect foraging resources used by wintering birds. Wintering birds are important at the County level. The magnitude of change is currently unknown. Therefore, there is likely to be a direct, permanent, long term effect on wintering birds, but it has not been possible to determine whether this will be significant at this stage.

7.8.106. Surveys are on-going for remaining ecological features for which the impact is relevant, preventing the assessment of impacts and their significance. However, the following assumptions are reasonable given the level of detail available:

- Bats: direct, permanent, long term effect through degradation of foraging and commuting areas within Crossness LNR and associated habitats.
- Breeding birds: direct, permanent, long term effect through degradation of nesting and foraging areas within Crossness LNR and associated habitats.
- Reptiles: direct, permanent, long term effect through degradation of grassland and scrub habitat supporting reptiles.
- Terrestrial invertebrates: direct, permanent, long term effect through degradation of supporting habitat.
- Water voles: direct, permanent, long term effect through degradation of ditch habitat supporting this species.
- Freshwater fish: direct, temporary, medium term effect through degradation of ditch habitat supporting these species.
- Aquatic macroinvertebrates: direct, permanent, long term effect through degradation of ditch habitat supporting these species.
- Macrophytes: direct, permanent, long term effect through die-off and degradation of ditch habitat supporting these species.

7.8.107. It is not possible at this stage to give a preliminary assessment of impacts of shading on notable plants and invasive species as surveys have not been completed and data analysed. This will be presented in the ES.

7.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

7.9.1. This section sets out the additional mitigation and compensation measures that are being developed as relevant for terrestrial biodiversity.

CONSTRUCTION PHASE

- Enhancement of floodplain grazing marsh habitat both onsite and offsite to replace important habitats of Crossness LNR/Erith Marshes MSINC, as shown on **Figure 7-7: Environmental Mitigation Opportunity Areas (Volume 2)**.
- Creation of new open water habitat (open mosaic habitat, ditches, ponds, wetland mosaic habitat) and reedbed habitat to replace important habitats of Crossness LNR, Erith Marshes MSINC and Belvedere Dykes SINC, as shown on **Figure 7-7: Environmental Mitigation Opportunity Areas (Volume 2)**. Habitat creation is being designed within the Site as part of landscaping of the Proposed Scheme, to incorporate grassland, reedbed, wet ditch and scrub habitats.
- Offsite habitat creation, alongside enhancement, is also being considered and discussed with stakeholders for an offsite location at the former Thamesmead Golf Course (shown on **Figure 7-7: Environmental Mitigation Opportunity Areas (Volume 2)**).
- Creation of other supporting habitats (e.g., scrub) important for Crossness LNR, Erith Marshes MSINC and Belvedere Dykes SINC, with focus on those land parcels shown on **Figure 7-7: Environmental Mitigation Opportunity Areas (Volume 2)**.
- Habitat creation would replace supporting habitat for other protected and notable species, foraging and commuting habitat for bats, nesting habitat for breeding birds, foraging habitat for wintering birds, habitat for reptiles and invertebrates. Open water and reedbed creation will be a key feature to provide replacement habitat for water voles due to loss of such habitats within the Site. Current focus on the land parcels shown on **Figure 7-7: Environmental Mitigation Opportunity Areas (Volume 2)**.
- Construction of the Proposed Jetty presents an enhancement opportunity for birds using the River Thames, as it would provide new feature for resting and roosting. This would support existing resting and roosting space on the existing Belvedere Power Station Jetty, if retained.
- Construction and operational design optimised to reduce effects of shading, e.g., by compressing the footprint of the Proposed Scheme.
- Capture and displacement/translocation of water voles to newly created replacement open water/reedbed habitat provided out of the construction footprint. This may involve an intermediate step of captive breeding. Capture and translocation would be undertaken under an appropriate Natural England licence.
- Improvement works to ditches, such as silt removal, litter picking and management to improve the habitat quality.

- Measures to reduce emissions from idling vehicles (as outlined in **Chapter 5: Air Quality (Volume 1)**), such as switching engines off when stationary to reduce air-borne pollutants.
- Pollution control measures to avoid effects of surface water run-off on habitats and species.
- Control of construction phase lighting to focus it on the construction areas and maintain dark corridors around designated sites and key habitats.

7.9.2. These measures will be set out in the ES and the OCoCP and OLEMP (where relevant) to be submitted with the application for development consent.

OPERATION PHASE

- Enhancement of habitats – increasing the biodiversity value of deciduous woodland habitat within the Site through a programme of management and increasing the value of floodplain grazing marsh/other neutral grassland habitats by a mixture of changes in management and seeding/planting (within the Mitigation Area shown on **Figure 1-3: Indicative Site Layout Plan (Volume 2)**).
- Enhancement of habitats within offsite areas, with focus on those land parcels shown in **Figure 7-7: Environmental Mitigation Opportunity Areas (Volume 2)**.
- Design development and operational controls to be explored as part of updated air quality models based on design evolution of the Site layout and any additional information from technology suppliers.
- Management of ditches and watercourses to improve macrophyte species diversity and ultimately macroinvertebrates and fish.
- Control of American mink (an invasive species and significant predator of water vole) through survey and trapping to ensure water vole populations are not predated by this species.
- Controls on timing of maintenance activities to avoid them occurring during sensitive periods, such as at night during the bat active season, early morning during the bird breeding season, and during dusk/dawn feeding periods during the season when wintering birds are present.
- Pollution control measures to avoid effects of surface water run-off on habitats and species.
- Control of operation phase lighting to focus it on the Carbon Capture Facility, the Proposed Jetty and Ancillary Infrastructure and to maintain dark corridors around designated sites and key habitats.
- Implementation of standards for Site cleanliness and controls to avoid build-up of waste (including food waste, unused materials, packaging etc) and degradation of habitats retained/created within the Proposed Scheme. To include a focus on waste attractive to rats (which can displace water voles).

7.9.3. These measures will be set out in the ES, OLEMP and the DAD, all of which will be prepared as part of the application for development consent. The measures will also be set out in the OEMP which will be prepared prior to the Proposed Scheme commencing operation and secured through DCO requirement.

7.10. MONITORING

- Clerk of works monitoring during the construction phase and other measures such as including monitoring light spill onto adjacent habitats, quality of surface water run-off and effectiveness of implementation of dust suppression measure are to be described in the OCoCP.
- Inspection of habitat creation works to ensure groundwork and plant growth are on path to generate the expected vegetation community and contribute biodiversity value as intended.
- Inspection of open water habitat creation to ensure features created hold water and suitable as replacement habitat and to support protected species (e.g., water voles).
- Survey of habitats subject to enhancement (deciduous woodland, floodplain grazing marsh) to demonstrate increase in biodiversity value and allow interventions as necessary.
- Monitoring of water vole population to determine the success of habitat creation and translocation for this species pursuant to a licence. This will include survey for American mink.
- Monitoring requirements in the OLEMP.

7.11. RESIDUAL EFFECTS

7.11.1. **Table 7-11** below summarises the residual effects associated with the Proposed Scheme.

Table 7-11: Terrestrial Biodiversity Summary of Residual Effects

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Construction Phase				
Habitat loss and fragmentation	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, Coastal and floodplain grazing marsh HPI, Intertidal mudflats HPI, Wintering birds.	**Moderate Adverse (significant)**	Habitat creation and enhancement both within the Site and in the offsite Environmental Mitigation Areas, comprising: • Enhancement of existing floodplain grazing marsh offsite. • Creation of mudflat within the River Thames. • Creation of new ditch and reedbed habitat both on and offsite. Proposals for habitat creation and enhancement are under development and subject to change depending on their feasibility.	**Negligible (not significant)**
Habitat loss and fragmentation	Modified grassland, reedbeds, other neutral grassland, mixed scrub, open mosaic habitat, standing water.	**Minor Adverse (not significant)**	Habitat creation and enhancement both within the Site and offsite, comprising: • Enhancement of existing floodplain grazing marsh offsite	**Negligible (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
			• Creation of new neutral grassland habitat on and offsite. • Creation of open mosaic habitat offsite. • Creation of new ditch and reedbed habitat both on and offsite. Proposals for habitat creation and enhancement are under development and subject to change depending on their feasibility.	
Habitat loss and fragmentation	Bats, breeding birds, notable plants and invasive species, reptiles, terrestrial invertebrates, water vole, aquatic macroinvertebrates, freshwater fish and macrophytes.	To be determined following completion of surveys and presented within the ES.	Habitat creation and enhancement. Proposals for habitat creation and enhancement are under development and subject to change depending on their feasibility.	To be determined following completion of surveys and presented within the ES.
Noise and vibration	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal	**Moderate Adverse (significant)**	Timing of certain works to avoid sensitive wintering period.	**Minor Adverse (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	Tributaries MSINC, wintering birds.			
Noise and vibration	Bats, breeding birds, reptiles, terrestrial invertebrates, water vole, freshwater fish.	To be determined following completion of surveys and presented within the ES.	Timing of certain works to avoid sensitive periods (e.g., vegetation clearance in bird breeding season and fish migration and spawning periods).	To be determined following completion of surveys and presented within the ES.
Dust	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, deciduous woodland HPI, coastal and floodplain grazing marsh HPI, intertidal mudflats HPI, coastal saltmarsh HPI, river habitat, modified grassland, reedbeds, other neutral grassland, mixed scrub, open mosaic habitat, standing water, bats, breeding birds, notable plants and invasive species, reptiles, terrestrial	**Negligible (not significant)**	None.	**Negligible (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	invertebrates, water vole, wintering birds, freshwater fish, aquatic macroinvertebrates, macrophytes.			
Surface water run-off	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, coastal and floodplain grazing marsh HPI, intertidal mudflats HPI, coastal saltmarsh HPI, river habitat, wintering birds.	**Moderate Adverse (significant)**	Pollution control measures.	**Negligible (not significant)**
Surface water run-off	Reedbeds, standing water.	**Minor Adverse (significant)**	Pollution control measures.	**Negligible (not significant)**
Surface water run-off	Bats, breeding birds, notable plants and invasive species, reptiles, terrestrial invertebrates, water vole, aquatic macroinvertebrates,	To be determined following completion of surveys and presented within the ES.	Pollution control measures.	To be determined following completion of surveys and presented within the ES.

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	freshwater fish and macrophytes.			
Lighting	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, wintering birds.	**Moderate Adverse (significant)**	Control of construction phase lighting to focus it on construction areas.	**Negligible (not significant)**
Lighting	Bats, breeding birds, reptiles, terrestrial invertebrates, water vole, aquatic macroinvertebrates, macrophytes and freshwater fish.	To be determined following completion of surveys and presented within the ES.	Control of construction phase lighting to focus it on construction areas	To be determined following completion of surveys and presented within the ES.
Changes in air quality	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, deciduous woodland HPI, coastal and floodplain grazing marsh HPI, intertidal mudflats HPI,	**Moderate Adverse (significant)**	Control of emissions, habitat enhancement.	**Minor Adverse (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	coastal saltmarsh HPI, river habitat.			
Changes in air quality	Modified grassland, reedbeds, other neutral grassland, mixed scrub, open mosaic habitat, standing water	**Minor Adverse (not significant)**	Control of emissions, habitat enhancement.	**Negligible (not significant)**
Changes in air quality	Aquatic macroinvertebrates, freshwater fish.	**Moderate Adverse (significant)**	Control of emissions, habitat enhancement.	**Minor Adverse (not significant)**
Changes in air quality	Macrophytes	**Negligible (not significant)**	Control of emissions, habitat enhancement.	**Negligible (not significant)**
Changes in air quality	Notable plants and invasive species.	To be determined following completion of surveys and presented within the ES.	None.	To be determined following completion of surveys and presented within the ES.
Shading	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, coastal and floodplain grazing marsh HPI, modified grassland, reedbeds, other neutral	To be determined following completion of modelling work and surveys and presented within the ES.	Potential effects would be mitigated through changes to construction equipment and methods, but requirements to be determined.	To be determined following completion of modelling work and surveys and presented within the ES.

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	grassland, mixed scrub, open mosaic habitat, standing water, bats, breeding birds, notable plants and invasive species, reptiles, terrestrial invertebrates, water vole, wintering birds, aquatic macroinvertebrates, freshwater fish and macrophytes.			
Operation Phase				
Noise and vibration	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, wintering birds.	**Moderate Adverse (significant)**	Timing of certain operations to avoid sensitive periods. Measures to control operational noise are to be included within the OEMP.	**Minor Adverse (not significant)**
Noise and vibration	Bats, breeding birds, reptiles, terrestrial invertebrates, water vole, freshwater fish.	To be determined following completion of surveys and presented within the ES.	Timing of certain operations to avoid sensitive periods.	To be determined following completion of surveys and presented within the ES.

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Maintenance activities	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, wintering birds.	**Moderate Adverse (significant)**	Timing of maintenance activities to avoid sensitive periods, amendment of working practices to reduce disturbance.	**Minor Adverse (not significant)**
Maintenance activities	Bats, breeding birds, water vole.	To be determined following completion of surveys and presented within the ES.	Timing of maintenance activities to avoid sensitive periods.	To be determined following completion of surveys.
Surface water run-off	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, coastal and floodplain grazing marsh HPI, intertidal mudflats HPI, coastal saltmarsh HPI, river habitat, wintering birds.	**Moderate Adverse (significant)**	Pollution control measures.	**Negligible (not significant)**
Surface water run-off	Reedbeds, standing water	**Minor Adverse (not significant)**	Pollution control measures.	**Negligible (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Surface water run-off	Bats, breeding birds, notable plants and invasive species, reptiles, terrestrial invertebrates, water vole, aquatic macroinvertebrates, freshwater fish and macrophytes.	To be determined following completion of surveys and presented within the ES.	Pollution control measures.	To be determined following completion of surveys and presented within the ES.
Lighting	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, wintering birds.	**Moderate Adverse (significant)**	Control of construction phase lighting to focus it on construction areas.	**Negligible (not significant)**
Lighting	Bats, breeding birds, reptiles, terrestrial invertebrates, water vole, aquatic macroinvertebrates, freshwater fish and macrophytes.	To be determined following completion of surveys and presented within the ES.	Control of construction phase lighting to focus it on construction areas.	To be determined following completion of surveys and presented within the ES.
Changes in air quality	Inner Thames Marshes SSSI and Ingrebourne Marshes SSSI, Crossness	**Potentially up to Moderate Adverse (significant)**	Design changes and operational controls.	**Potentially up to Moderate Adverse (significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	LNR, Rainham Marshes LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, 18 further SINCs outside of the Site, deciduous woodland HPI, coastal and floodplain grazing marsh HPI, intertidal mudflats HPI, coastal saltmarsh HPI, river habitat.			
Changes in air quality	Modified grassland, reedbeds, other neutral grassland, mixed scrub, open mosaic habitat, standing water, macrophytes.	**Negligible (not significant)**	Design changes and operational controls.	**Negligible (not significant)**
Changes in air quality	Notable plants and invasive species.	To be determined following completion of surveys and presented within the ES.	Design changes and operational controls.	To be determined following completion of surveys and presented within the ES.

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Changes in air quality	Freshwater fish, aquatic Macroinvertebrates	**Potentially up to Moderate Adverse (significant)**	Habitat management and improvement.	**Potentially up to Minor Adverse (not significant)**
Shading	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, Coastal and floodplain grazing marsh HPI, modified grassland, reedbeds, other neutral grassland, mixed scrub, open mosaic habitat, standing water, bats, breeding birds, notable plants and invasive species, reptiles, terrestrial invertebrates, water vole, wintering birds, aquatic macroinvertebrates, freshwater fish and macrophytes.	To be determined following completion of modelling work and surveys and presented within the ES.	Potential effects would be mitigated through changes to design of the Proposed Scheme, but requirements to be determined.	To be determined following completion of modelling work and surveys and presented within the ES.

7.12. NEXT STEPS

7.12.1. Further work to be completed and included in the ES comprises:

- The terrestrial biodiversity assessment will be further developed and refined based on any relevant responses to the Statutory Consultation.
- The detailed assessment within the ES will involve a review of the terrestrial biodiversity assessment presented in this chapter, based on further information as part of ongoing design development.
- Completion of ecological survey work and reporting of results.
- Evaluation of habitats for their biodiversity value using Defra's biodiversity metric (currently version 4) to inform the Proposed Scheme's landscape masterplan and Biodiversity Net Gain assessment.
- Development of the Proposed Scheme's landscape masterplan, incorporating delineation of the operational area layout, definition of relevant parameters and plans for habitat creation and enhancement, to be presented within the DAD. This will include outline design of habitats within the Site.
- Completion of operational parameters and air quality modelling.
- Development of offsite habitat creation proposals.
- Development of detailed mitigation proposals for protected species.

7.13. LIMITATIONS AND ASSUMPTIONS

7.13.1. This section outlines the limitations, uncertainties, and assumptions made in undertaking terrestrial biodiversity reported in this technical chapter.

- The assessment undertaken in this chapter was limited by incomplete ecological surveys, which are on-going during the summer and autumn of 2023. However, sufficient information was available to determine residual effects of the Proposed Scheme for the majority of ecological features. Where insufficient information is available from surveys, this has been made clear.
- The initial freshwater aquatic habitat scoping survey within the Site was not completed during the optimal macrophyte survey season, generally accepted to be from June to September (inclusive). Further survey was conducted in June 2023, which was limited due to access restrictions. However, for those areas surveyed, the macrophyte assemblage was typical of that expected based on desk study information. It is therefore considered that sufficient information was gathered to enable a robust assessment of the macrophyte species present, and to determine residual effects, both within the freshwater watercourses and the ponds present within the Site.

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DECARBONISATION

CHAPTER 8: MARINE BIODIVERSITY

Cory Decarbonisation Project

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TABLE

8. MARINE BIODIVERSITY

8.1. INTRODUCTION

8.1.1. This chapter reports the preliminary assessment of the likely significant effects of the Proposed Scheme on marine biodiversity during construction and operation and describes:

- relevant policy, legislation and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operational phase.

8.2. POLICY, LEGISLATION, AND GUIDANCE

8.2.1. The policy, legislation, and guidance relevant to the assessment of marine biodiversity for the Proposed Scheme is detailed in **Table 8-1**.

Table 8-1: Marine Biodiversity Summary of Key Policy, Legislation, and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011[1]	Sets out the Government's policy for delivery of nationally significant energy infrastructure and is currently the primary basis for decision making of applications that fall within the Planning Act 2008 regime. NPS EN-1 contains the following policy statements of key relevance for the purpose of the assessment of environmental impacts on marine biodiversity: • The SoS must *"consider whether the project may have a significant effect on a European Site, or any site to which the same protection"* must be made under the Conservation of Habitats and Species Regulations 2017 (Paragraph 4.3.1). • *"As a general principle, and subject to the specific policies below, development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives…where significant harm cannot be avoided, then appropriate compensation measures should be sought"* (Paragraph 5.3.7).

Policy, Legislation or Guidance	Description
	• *"The most important sites for biodiversity are those identified through international conventions and European Directives. The Habitats Regulations provide statutory protection for these sites but do not provide statutory protection for potential Special Protection Areas (pSPAs) before they have been classified as a SPA. For the purposes of considering development proposals affecting them, as a matter of policy the Government wishes pSPAs to be considered in the same way as if they had already been classified. Listed Ramsar sites should, also as a matter of policy, receive the same protection"* (Paragraph 5.3.9). • *"Where a proposed development on land within or outside an SSSI is likely to have an adverse effect on an SSSI (either individually or in combination with other developments), development consent should not normally be granted. Where an adverse effect, after mitigation, on the site's notified special interest feature is likely, an exception should only be made where the benefits (including need) 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 5.3.11). • *"Marine Conservation Zones (MCZs) (Marine Protected Areas in Scotland), introduced under the Marine and Coastal Access Act 2009, are areas that have been designated for the purpose of conserving marine flora or fauna, marine habitats or types of marine habitat or features of geological or geomorphological interest. The protected feature or features and the conservation objectives for the MCZ are stated in the designation order for the MCZ, which provides statutory protection for these areas implemented by the MMO…As a public authority, the IPC is bound by the duties in relation to MCZs imposed by sections 125 and 126 of the Marine and Coastal Access Act 2009"* (Paragraph 5.3.12). • *"Sites of regional and local biodiversity and geological interest, which include Regionally Important Geological Sites, Local Nature Reserves and Local Sites, have a fundamental role to play in meeting overall national biodiversity targets; contributing to the quality of life and the well-being of the community; and in supporting research and education"* (Paragraph 5.3.13).

Policy, Legislation or Guidance	Description
	• *"Other species and habitats have been identified as being of principal importance for the conservation of biodiversity in England and Wales and thereby requiring conservation action…weight to any such harm to the detriment of biodiversity features of national or regional importance which it considers may result from a proposed development"* (Paragraph 5.3.17).
Draft Overarching National Policy Statement (NPS) for Energy EN-1 2023[2]	This Draft Overarching National Policy Statement for Energy (EN-1) is part of a suite of draft NPSs issued by the Secretary of State for Energy Security and Net Zero. It sets out the government's policy for delivery of major energy infrastructure and will likely replace the 2011 NPSs by the time the application for the Proposed Scheme is submitted. Paragraph 4.4.1 of the policy notes that Marine plans apply in the 'marine area', the area from Mean High Water Springs to the seaward limit of the Exclusive Economic Zone (EEZ). The 'marine area' also includes the waters of any estuary, river or channel, so far as the tide flows at mean high water spring tide. Paragraph 4.5.2 of the policy highlights that "*Biodiversity net gain is an essential component of environmental net gain. Projects in England should consider and seek to incorporate improvements in natural capital, ecosystem services and the benefits they deliver when planning how to deliver biodiversity net gain*". Although achieving biodiversity net gain is not currently (and expected to be the case until at least November 2025) an obligation for projects under the Planning Act 2008, energy NSIP proposals should seek opportunities to contribute to and enhance the natural environment by providing net gains for biodiversity where possible. Biodiversity net gain should be applied in conjunction with the mitigation hierarchy and does not change or replace existing environmental obligations. Within the current metric, all habitats in the intertidal zone, or above the mean low water mark, would be eligible for enhancement for biodiversity net gain. Marine plans set out marine specific aspects of many of the assessment principles in noise and vibration (Section 5.12) and water quality (Section 5.16). Individual Marine Plans should be consulted to understand marine relevant specific considerations.

Policy, Legislation or Guidance	Description
National Planning Policy Framework (NPPF) 2023[3]	The NPPF sets out the Government's planning policies for England and how these should be applied. The following paragraphs relate to marine biodiversity. Section 15 of the NPPF incorporates policies requiring that development impacts on both terrestrial and marine biodiversity are minimised. Paragraph 174 in Section 15 states that "*planning policies and decisions should contribute to and enhance the natural and local environment by:* • *"Minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;* • *Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and* • *Remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate".* Paragraph 179. To protect and enhance biodiversity and geodiversity, plans should: • *"Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; and* • *promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity".* Paragraph 180. When determining planning applications, local planning authorities should apply the following principles: • *"if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately*

Policy, Legislation or Guidance	Description
	mitigated, or, as a last resort, compensated for, then planning permission should be refused; • *development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate".*
The London Plan 2021[4]	The Spatial Development Strategy for Greater London setting out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policies G1, G6, SI14 and SI17 of the London plan are the key policies specific to marine biodiversity within Greater London: • Policy G1: Green Infrastructure – *"…Green infrastructure should be planned, designed and managed in an integrated way to achieve multiple benefits. Boroughs should prepare green infrastructure strategies that identify opportunities for cross-borough collaboration, ensure green infrastructure is optimised and consider green infrastructure in an integrated way as part of a network"*. • Policy G6: Biodiversity and Access to Nature – *"Boroughs, in developing Development Plans should use up-to-date information about the natural environment and the relevant procedures to identify SINCs and ecological corridors to identify coherent ecological network…support the protection and conservation of priority species and habitats that sit outside the SINC network, and promote opportunities for enhancing the using Biodiversity Action Plans…seek opportunities to create other habitats, or features such as artificial nest sites, that are of particular relevance and benefit in an urban context…ensure designated sites of European or national nature conservation importance are clearly identified and impacts assessed in accordance with legislative requirements…Development proposals should manage impacts on biodiversity and aim to secure net biodiversity gain. This should be informed by the best available ecological information and addressed from the start of the development process"*. • Policy SI14: Waterways - strategic role – "*Development Plans and development proposals should address the*

Policy, Legislation or Guidance	Description
	strategic importance of London's network of linked waterways, including the River Thames, and should seek to maximise their multifunctional social, economic and environmental benefits". • Policy SI17: Protecting and enhancing London's waterways – *"Development Plans should support river restoration and biodiversity improvements….Development proposals along London's canal network, docks, other rivers and water spaces (such as reservoirs, lakes and ponds) should respect their local character, environment and biodiversity…Development Plans should identify opportunities for increasing local distinctiveness and recognise these water spaces as environmental, social and economic assets".*
The Bexley Local Plan 2023[5]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development in the Borough. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. The key policies relating to marine biodiversity within the Borough are: • SP8: Green infrastructure including designated Green Belt – *"Bexley's green infrastructure, including open spaces and waterways will be protected, enhanced, restored and promoted as valuable resources to provide a healthy integrated network for the benefit of nature, people and the economy. Future development must support the delivery of a high-quality, well-connected and sustainable network of open spaces".* • SP9: Protecting and Enhancing Biodiversity and Geological Assets – which "*seeks to ensure that the quantity of Bexley's biodiversity is protected and enhanced, including avoiding adverse impacts from development on species and sites of nature conservation value*"; and • DP19: The River Thames and the Thames Policy Area – the policy states that: – *"Development proposals for riverside sites should investigate the potential for full or part realigned flood defences prior to commencement of site planning, and are required to:*

Policy, Legislation or Guidance	Description
	~ *follow the strategies for water management set out in the TE2100 Plan and subsequent updates;* ~ *enhance the relationship between the development site and the Thames; and,* ~ *contribute to the completion of the Thames Path, a continuous public riverside footpath and cycleway, including safeguarding existing or providing new access points to the riverside path.* – *The Council encourages improving the efficiency and promoting the sustainability of waterborne freight movements, including waste transfer and aggregates handling, on the Thames. Viable wharves are safeguarded for such uses through a Direction by the Secretary of State.* – *Proposals in the Thames Policy Area should pay attention to their impacts on the ecology of the River Thames, and on its priority habitats and protected species. Ecological enhancements will be sought from all proposals; development directly adjacent to the River should look to enhance essential fish habitats and reduce the risk of invasive species.* – *The Council will encourage improved access to nature across the Thames Policy Area. Opportunities should be sought to link proposed and existing wildlife corridors, including the Ridgeway Link, Thames Marshes corridor, Thamesmead Link and the River Thames itself, and integrating these networks with pedestrian and cycle paths where appropriate.* – *Habitat creation and enhancement will be promoted. Opportunities should also be sought for related enhancements to visitor's centres and other facilities. Habitat creation along the Thames should aim to improve the area's flood resilience and water management."* • DP20: Biodiversity and Geodiversity in Developments – which presents the matters that proposed development must consider, including the mitigation hierarchy, biodiversity net gain, enhancement measures and opportunities to connect and improve the wider ecological networks, and wildlife corridors. It also states that development proposals that "*would have a direct or indirect impact on a site designated for its nature conservation or geological interest should*

Policy, Legislation or Guidance	Description
	protect and enhance the designated site's value, and will not be permitted unless all of the following criteria are met: – *there are no reasonable, less damaging, alternative solutions, locations or sites;* – *ecological buffer zones have been incorporated into the scheme, where appropriate, to protect and enhance the designated site's intrinsic value;* – *the continuity of wildlife habitat within wildlife corridors is maintained; and* – *access to the designated site is not compromised and where possible, access and/or interpretation is improved".*
London Environment Strategy 2018[6]	The London Environment Strategy and its appendices include aims relevant to marine biodiversity. By 2050, through green infrastructure the strategy states that "*London will be the world's first National Park City, where more than half of its area is green, where the natural environment is protected, and where the network of green infrastructure is managed to benefit all Londoners*" and greener outcomes under the strategy will be that "*All Londoners should be able to enjoy the very best parks, trees and wildlife. Creating a greener city is good for everyone – it will improve people's health and quality of life, support the success of businesses and attract more visitors to London*". It states these aims would be achieved through one of four strategic approaches, specifically that of "*green infrastructure and natural capital accounting*". Policy 5.2.1 is relevant to marine biodiversity "*Protect a core network of nature conservation sites and ensure a net gain in biodiversity*". The relevant constituent Policy Proposals are: • Proposal 5.2.1 *"a The London Plan includes policies on the protection of Sites of Importance for Nature Conservation (SINCs) and Regionally Important Geological Sites (RIGS)";* • Proposal 5.2.1.b *"The Mayor will develop a biodiversity net gain approach for London, and promote wildlife-friendly landscaping in new developments and regeneration projects"; and* • Proposal 5.2.1.c *"The Mayor will provide guidance and support on the management and creation of priority habitats, the conservation of priority species, and the establishment of wildlife corridors".*

Policy, Legislation or Guidance	Description
The UK Post-2010 Biodiversity Framework 2012[7]	The UK Post-2010 Biodiversity Framework covers the period from 2011 to 2020 and was developed in response to two main drivers: the Convention on Biological Diversity's Strategic Plan for Biodiversity 2011-2020[7], and its five strategic goals; and 20 'Aichi Targets'[7]. The targets set in this framework are still valid, even though the period has now elapsed. The Biodiversity Framework shows how the work of the four UK countries joins up with work at a UK level to achieve the 'Aichi Targets' and the aims of the EU Biodiversity Strategy. It identifies the activities required to complement each country's biodiversity strategy, and where work in the country strategy contributes to international obligations.
A Green Future: Our 25 Year Plan to Improve the Environment 2018[8]	Released in 2018, the UK Government's environment plan sets out goals for improving the environment within a 25 year timeframe. It details how the government will work with communities and businesses to achieve the goals, which include several of relevance to biodiversity including that wildlife and plants should thrive, resources from nature should be used more sustainably and efficiently, there should be mitigation and adaptation to climate change and that biosecurity should be enhanced.
Bexley Biodiversity Action Plan (BAP) 2011[9]	The Bexley BAP aims to achieve targets relevant to the London Borough of Bexley identified in both the UK and London BAP. The action plan lists habitats and species (including marine/estuarine habitat and species) within Bexley for which targets have been set to increase their range and distribution.
Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services 2011[10]	Biodiversity 2020 provides a comprehensive picture of how international and EU commitments are implemented in England and sets out the strategic direction for biodiversity policy for the next decade on land (including rivers and lakes) and at sea. This is the most up to date strategy dealing with England's Wildlife and Ecosystem services available.
South East Inshore Marine Plan 2021[11]	The South East Inshore Marine Plan area stretches from Felixstowe in Suffolk to west of Dover in Kent and incorporates the River Thames. It will help to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan area. The South East Inshore Marine Plan Marine states the following:

Policy, Legislation or Guidance	Description
	"Proposals that may have adverse impacts on the objectives of marine protected areas must demonstrate that they will, in order of preference: avoid, minimise and mitigate adverse impacts, with due regard given to statutory advice on an ecologically coherent network. *Proposals that enhance a marine protected area's ability to adapt to climate change, enhancing the resilience of the marine protected area network, will be supported.* *Proposals that may have adverse impacts on an individual marine protected area's ability to adapt to the effects of climate change, and so reduce the resilience of the marine protected area network must demonstrate that they will, in order of preference: avoid, minimise and mitigate adverse impacts.* *Proposals that enhance the distribution of priority habitats and priority species will be supported. Proposals that may have significant adverse impacts on the distribution of priority habitats and priority species must demonstrate that they will, in order of preference: avoid, minimise, mitigate and compensate for significant adverse impacts that cannot be mitigated.* *Proposals that enhance or facilitate native species or habitat adaptation or connectivity, or native species migration, will be supported.* *Proposals that may cause significant adverse impacts on native species or habitat adaptation or connectivity, or native species migration, must demonstrate that they will, in order of preference: avoid, minimise, mitigate- adverse impacts so they are no longer significant and compensate for significant adverse impacts that cannot be mitigated.* *Proposals that conserve, restore or enhance coastal habitats, where important in their own right and/or for ecosystem functioning and provision of ecosystem services, will be supported. Proposals must take account of the space required for coastal habitats, where important in their own right and/or for ecosystem functioning and provision of ecosystem services, and demonstrate that they will, in order of preference: avoid, minimise, mitigate and compensate for net habitat loss.* *Proposals that reduce the risk of introduction and/or spread of invasive non-native species should be supported.*

Policy, Legislation or Guidance	Description
	Proposals must put in place appropriate measures to avoid or minimise significant adverse impacts that would arise through the introduction and transport of invasive non-native species, *Proposals that may have significant adverse impacts on highly mobile species through disturbance or displacement must demonstrate that they will, in order of preference: avoid, minimise and mitigate- adverse impacts so they are no longer significant.* *Proposals that result in the generation of impulsive sound must contribute data to the UK Marine Noise Registry as per any currently agreed requirements.* *Proposals that result in the generation of impulsive or non-impulsive noise must demonstrate that they will, in order of preference: avoid, minimise and mitigate- adverse impacts on highly mobile species so they are no longer significant. If it is not possible to mitigate significant adverse impacts, proposals must state the case for proceeding."*
The Thames River Basin District Management Plan 2022[12]	The Thames River Basin District (RBD) River Basin Management Plan describes the challenges that threaten the water environment and how these challenges can be managed.
Legislation	
Environment Act 2021[13]	The Environment Act 2021 makes provision for targets, plans and policies for improving the natural environment. Section 98 of the Environment Act specifies that measures outlined in Schedule 14 of the Environment Act, to make provision for biodiversity gain to be a condition of planning permission in England, are to apply. Schedule 14 specifies that biodiversity gains are to be assessed using the metric published by the SoS and a 10% gain will be mandatory. The Act includes this requirement for NSIP, being secured under Section 99 and Schedule 15 of the Planning Act 2008. It is expected that the mandatory requirement for a 10% gain will come into force in November 2025 through the provision of biodiversity gain statements or updates to the NPS. A BNG assessment for the Proposed Scheme will be submitted as part of the application for development consent, notwithstanding that the statutory provisions for BNG are not yet in force.

Policy, Legislation or Guidance	Description
The Wildlife and Countryside Act 1981 (as amended) (WCA)[14]	The primary legislation in the United Kingdom for the protection of animals, plants and habitats in the UK. This legislation covers three main areas: • Wildlife protection, including protection of wild birds, their eggs and nests, protection of other animal and protection of plants; • Nature Conservation, Countryside and National Parks; and • Public rights of way (PRoW). Various species of fish and marine animals are also protected from being killed, injured or disturbed under provisions in Schedule 5 of the WCA. All cetaceans (whales and dolphins) are protected under Schedule 5, making it is an offence to take, injure or kill these species. Disturbance in their place of rest, shelter or protection is also prohibited.
The Natural Environment and Rural Communities (NERC) Act 2006[15]	The NERC Act was designed to help achieve a rich and diverse natural environment and thriving rural communities through modernised and simplified arrangements for delivering Government policy. The NERC Act established a new independent body (Natural England) responsible for conserving, enhancing, and managing England's natural environment for the benefit of current and future generations, thereby contributing to sustainable development. The NERC Act made amendments to both the WCA and the Countryside and Rights of Way ('CROW') Act 2000. Section 40 of the NERC Act imposes a duty on public authorities "*In exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity*". This duty was extended by the Environment Act 2021 to refer also to the enhancement and improvement of biodiversity, going beyond the mere maintenance of biodiversity in its current state. Section 41 of the NERC Act requires the Secretary of State (SoS) to "*publish a list of the living organisms and types of habitat which in the Secretary of State's opinion are of principal importance for the purpose of conserving biodiversity*". These are referred to as Habitats/Species of Principal Importance.
The Conservation of Habitats and Species	The Habitats Regulations, which implement the Habitats Directive (EC Directive 92/43/EEC) in the United Kingdom, and in particular Regulation 63, require the competent authority consenting a development to determine whether appropriate

Policy, Legislation or Guidance	Description
Regulations 2017 (as amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019) ('the Habitats Regulations') 2017[16]	assessment is necessary before deciding whether to give consent, permission or other authorisation for plan or project which: • *"is likely to have a significant effect on a European Site (either alone or in combination with other projects)";* and • *"is not directly connected with or necessary to the management of that site must make an appropriate assessment of the implications of the plan or project for that site in view of that site's conservation objectives"*. In the case of the Proposed Scheme, the competent authority is the SoS. To enable the competent authority to determine whether an appropriate assessment is necessary a person applying for any such consent, permission or other authorisation must provide such information as the competent authority may reasonably require for this purpose. If a plan or project may adversely impact a European Site, Regulation 64 of the Habitats Regulations provides that the competent authority may agree to the plan or project notwithstanding that adverse assessment of the implications for the European Site only where it is satisfied that: • there is no alternative solution to the plan or project to avoid the adverse impact; and • the plan or project must be carried out for "imperative reasons of overriding public interest" including those of a social or economic nature. Where the site to be adversely impacted hosts a priority natural habitat type[17] or a priority species, the "imperative reasons of overriding public interest" must be either: • *"reasons relating to human health, public safety or beneficial consequences of primary importance to the environment";* or • *"any other reasons which the competent authority, having due regard to the opinion of the European Commission, considers to be imperative reasons of overriding public interest[18]".* In addition, Regulation 55 requires "*Licences for certain activities relating to animals or plants*", namely where activities would lead to adverse effects on species identified by the Habitats Regulations.

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	The Habitat Regulations have created a national site network for both terrestrial biodiversity (see **Chapter 7: Terrestrial Biodiversity (Volume 1)**) and marine biodiversity (this chapter), including both the inshore and offshore marine areas in the UK. This new national site network includes existing Special Areas of Conservation (SAC) and Special Protection Areas (SPA), and new SAC and SPA designated under these regulations. Any references to Natura 2000 in the Conservation of Habitats and Species Regulations 2017 now refers to the new national site network. It is also a matter of government policy that Ramsar sites are considered in the assessment process, as described in part 181 of the National Planning Policy Framework[3].
The Convention on the Conservation of European Wildlife and Natural Habitats 1979 (the 'Bern Convention')[19]	The principal aims of the Bern Convention are the conservation and protection of the wild plant and animal species (and the natural habitats thereof) listed in Appendices I and II of the Convention. It also seeks to increase co-operation between governments and to regulate the exploitation of species listed in Appendix III, which includes migratory fish species, cetaceans and grey seal. The Convention was transposed into UK law by the WCA[14].
The Salmon and Freshwater Fisheries Act 1975 (SAFFA)[20]	The Act covers regulation of fisheries in England and Wales and includes legislation that restricts the introduction of polluting effluents, the obstruction of fish passage (screens, dams, weirs, culverts etc.) illegal means of fishing, permitted times of legal fishing and fishing licencing (which covers electric fishing). Under this Act any person who causes or knowingly permits to flow, or puts or knowingly permits to be put, into any waters containing fish or into any tributaries of waters containing fish, any liquid or solid matter to such an extent as to cause the waters to be poisonous or injurious to fish or the spawning grounds, spawn or food of fish, shall be guilty of an offence. The Act requires that fish passes are installed on new and rebuilt barriers that affect waters frequented by salmon or migratory trout.
The Eels (England and Wales)	The Eels (England and Wales) Regulations 2009 implement Council Regulation (EC) No 1100/2007 of the Council of the European Union, which required Member States to establish

Policy, Legislation or Guidance	Description
Regulations 2009[21]	measures for the recovery of the stock of European eel *Anguilla anguilla*. The regulations apply to England and Wales. The Regulations give powers to the regulators (the Environment Agency and Natural Resources Wales) to implement recovery measures in all freshwater and estuarine waters in England and Wales. The aim of the regulations is to achieve 40% escapement of adult eels relative to escapement levels under pristine conditions. The measures, as set out in the legislation, by which this is to be achieved are to reduce fishing pressures, improve access and habitat quality and reduce the impact of impingement and entrainment. Under the Regulations, the regulators can serve notice to companies detailing their legal obligation to screen intakes and outfalls for eel and/or to remove or modify obstructions to eel migration. However, it is possible for companies to be granted with exemptions if the costs of works greatly exceeds the benefits. In such a situation it is likely the regulator will seek a package of more cost-effective, *"alternative measures".*
The Water Environment (Water Framework Directive) (England and Wales) Regulations (the 'Water Framework Regulations') 2017[22]	The Water Framework Directive (WFD) (2000/60/EC) establishes a framework for the management and protection of Europe's water resources. It was implemented in England and Wales through Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (as amended). The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (as amended) has subsequently been revoked and replaced by the Water Framework Regulations. The purpose of the Water Framework Regulations is to establish a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater. All water bodies (unless artificial or heavily modified) are required to achieve 'good' ecological status unless alternate objectives are set or there are grounds for deterioration. Ecological status demonstrates the quality of the structure and function of surface water ecosystems indicated through 'quality elements'. These include hydromorphological, chemical and biological indicators (including benthic invertebrates, macroalgae, fish, phytoplankton and angiosperms). When considering the effect of a development or activity on a water body, it is a regulatory requirement under the Water Framework Regulations to assess if it will cause or contribute to

Policy, Legislation or Guidance	Description
	a deterioration in status or jeopardise the water body achieving good status in the future. Water Framework Regulations lists Lower and Higher Sensitivity Habitats that is considers important features that require protection. Where a development is considered to cause deterioration, or where it may contribute to the failure of the water body to meet Good Ecological Status or Good Ecological Potential Status, then an assessment to demonstrate that the development is exempt under Article 4.7. This makes provision for deterioration of status, provided that certain stringent conditions are met. Under the Water Framework Regulations water bodies can become WFD-designated. WFD-designated water bodies each have a status.
Conservation of Seals Act 1970[23]	Pinnipeds, commonly known as seals, are protected under the Conservation of Seals Act. This Act does not prohibit the killing of seals but does regulate the way in which seals can be killed. For example, there is an annual close season for grey seals extending from 1st September to 31st December and an annual close season for common seals extending from 1st June to 31st August. It is a criminal offence to wilfully kill, injure or take a seal during the close season or to attempt to do so. The Act also gives the SoS the power to make an order prohibiting the killing, injuring or taking of seals in an area where such an order is necessary for the proper conservation of seals. This legislation is pertinent to the Proposed Scheme due to the common present of grey and harbour seal in the Thames Estuary (within in which the Proposed Scheme is located).
The Convention for the Protection of the Marine Environment in the North-East Atlantic 1992 (the OSPAR Convention)[24]	The OSPAR Convention provides a comprehensive approach to addressing sources of maritime pollution and other matters affecting the marine environment. Annex V of the Convention provides a framework for governments to develop their own conservation measures. Article 2 requires parties to "*take all possible steps to prevent and eliminate pollution and shall take the necessary measures to protect the maritime area against the adverse effects of human activities so as to safeguard human health and to conserve marine ecosystems ad, when practicable, restore marine areas which have been adversely effected".* The OSPAR Convention includes the establishment of a list of threatened and/or declining species and habitats. This list provides an overview of the biodiversity in need of protection in

Policy, Legislation or Guidance	Description
	the north-east Atlantic and is being used by the OSPAR Commission to guide the setting of priorities for further work. The most recent OSPAR List of Threatened and/or Declining Species and Habitats includes the following marine species: native oyster *Ostrea edulis*, Allis shad *Alosa alosa*, European eel *Anguilla anguilla*, Atlantic cod *Gadus morhua*, sea lamprey *Petromyzon marinus*, thornback ray *Raja clavata*, Atlantic salmon *Salmo salar* and harbour porpoise *Phocoena phocoena* which are listed as being under threat and/or in decline in Region II (the Greater North Sea, which includes the Thames Estuary (within which the Proposed Scheme is located).
The Marine and Coastal Access Act 2009[25]	Marine Conservation Zones (MCZs) are a type of marine protected area that can be designated in English, Welsh and Northern Irish territorial and offshore waters, including the Thames Estuary. There are 91 MCZs in waters around England. MCZs are areas that protect a range of nationally important, rare or threatened habitats and species. Each MCZ is established by a legal order made by Defra under Section 116 (1) of the Marine and Coastal Access Act. Section 126 of the Marine and Coastal Access Act places specific duties on all public bodies relating to MCZ and decision making. Section 126 applies where:- • *"a public authority has the function of determining an application (whenever made) for authorisation of the doing of an act, and* • *The act is capable of affecting (other than insignificantly) -* – *the protected features of an MCZ;* – *any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent".* A Deemed Marine Licence is required if the Proposed Scheme involves activities which are licensable under Part 4 of the Marine and Coastal Access Act. This states that "*No person may (a) carry on a licensable marine activity, or (b) cause or permit any other person to carry on such an activity, except in accordance with a marine licence granted by the appropriate licensing authority".* Licensable marine activities related to the Proposed Scheme include:

Policy, Legislation or Guidance	Description
	• *"To deposit any substance or object anywhere in the sea or on or under the sea bed from a vehicle, vessel, aircraft, marine structure or floating container which was loaded with the substance or object – (a) in any part of the United Kingdom except Scotland, or (b) in the UK marine licensing area"* • *"To use a vehicle, vessel, aircraft, marine structure or floating container to remove any substance or object from the sea bed within the UK marine licensing area."* • *"To carry out any form of dredging within the UK marine licensing area (whether or not involving the removal of any material from the sea or sea bed)".* A Deemed Marine Licence will therefore be included in the draft DCO to be submitted with the DCO application. The licensing authority (MMO) will enforce the parts of a DCO that relate to a deemed marine licence and will be responsible for dealing with any breaches of any conditions of those approvals.
Guidance	
National Planning Practice Guidance (2021)[26]	Explains the processes and tools that can be used through the planning system in England. In relation to terrestrial biodiversity, guidance on Appropriate Assessment (i.e., the assessment of effects on sites designated under the Conservation of Habitats and Species Regulations 2017) and Environmental Impact Assessment are relevant. The guidance advises how to identify suitable mitigation and adaptation measures in the planning process. This would require the implementation of appropriate measures by the local planning authorities. The guidance particularly recommends development of brownfield sites over greenfield sites, implementation of green infrastructure networks in development, avoidance of effects on important ecological sites and species and use of appropriate mitigation where necessary.
Chartered Institute of Ecology and Environmental Management (CIEEM) Guidance 2017[27]	These pieces of guidance aim to increase the quality of ecological reports supporting development applications by laying down minimum standards for what should be covered by ecologists undertaking such studies, and also defining best practice in baseline ecological reporting.

8.3. SCOPING OPINION AND CONSULTATION

8.3.1. An EIA Scoping Opinion[28] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26th May 2023. The responses from the Planning Inspectorate in relation to marine biodiversity and how these requirements should be addressed by the Applicant are set out in **Table 8-2** below.

Table 8-2: Summary of the EIA Scoping Opinion in Relation to Marine Biodiversity

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Planning Inspectorate			
3.4.1	Internationally designated sites – construction and operation	*"The Inspectorate is content that significant effects are not likely and agrees to scope this matter out."*	No response required.
3.4.2	Nationally designated sites (with the exception of Medway Estuary Marine Conservation Zone (MCZ)) - construction and operation	*"The Inspectorate agrees to scope this matter out."*	No response required.
3.4.3	Impacts from any changes arising from the Proposed Development to deposition of airborne contaminants - construction and operation	*"The Inspectorate agrees to scope this matter out."*	No response required.
3.4.4	Effects on phytoplankton - construction and operation	*"At this stage, no details have been provided regarding the duration and frequency of dredging activities and therefore the Inspectorate does not agree to scope this matter out."*	As detailed in **Chapter 2: Proposed Scheme and Site Description (Volume 1)**, there are two options being considered of relevance to dredging activities. The worst-case position for the arrangement of the Proposed Jetty in terms of dredge volume is Option 3. The capital dredge volume for Option 3 is approximately 180,000m^3.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			One or a combination of dredging methods will be adopted; Water Injection Dredging (WID), Trial Suction Hopper Dredging and/or Backhoe Dredging. The duration of dredging depends on: which dredging method is used; weather; size of hopper available; and number of vessels able to work on the capital dredge operation. Therefore, the duration of dredging cannot be estimated at this stage. WID is already a commonly used maintenance dredging method in the River Thames[29]. A preliminary assessment on the likely effects on phytoplankton during the construction and operation phase has been set out in **Section 8.8** of this technical chapter. It should be noted that the dredging activity will be localised and will be located within an already highly turbid area (the Study Area is within the most turbid area of the River Thames[30]).

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.4.5	Vagrant marine mammal species - construction and operation	*"The Scoping Report states that vagrant marine mammals such as humpback whale and beluga whale have been scoped out as they are not resident species within the Thames Estuary. The Inspectorate agrees this matter may be scoped out."*	No response required.
3.4.6	Loss or disturbance of habitat (fish and marine mammals) - construction and operation.	*"The area of habitat loss and its importance to species has not been detailed within the Scoping Report and the Inspectorate does not consider that sufficient information regarding the extent, duration and frequency of proposed activities has not been provided in order to confirm the absence of a significant effect. As such, the Inspectorate does not agree to scope this matter out of the ES. The assessment of effects during the operational phase should explain how the frequency of maintenance activities has been determined. If this remains to be determined at the point of assessment, then the assessment should be based on a worst-case scenario."*	As detailed in **Chapter 2: Proposed Scheme and Site Description (Volume 1)**, there are two options being considered of relevance to dredging activities. The worst-case position for the arrangement of the Proposed Jetty, in terms of dredge volume is Option 3. The capital dredge volume for Option 3 is approximately 180,000m^3. **Chapter 2: Proposed Scheme and Site Description (Volume 1)** states that once operational up to five marine vessels will call at the Proposed Jetty each week to collect and transport LCO_2 to meet the annual throughput. Maintenance dredging during operation will be limited across the anticipated 50-year design life. During this time, there is unlikely to be a requirement for significant maintenance of piles nor concrete marine

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			structures and this maintenance is anticipated to be undertaken from land e.g., servicing quay equipment. The exact volumes and frequency of the maintenance dredging will depend on the design evolution of the Proposed Jetty. Further information on the volumes and frequency of construction, operation and maintenance dredging will be presented in the ES. A preliminary assessment of the Likely effects on the loss or disturbance of habitats (fish and marine mammals) during the construction and operation phase for all activities (including but not limited to dredging) (including maintenance) has been included in **Section 8.8** of this technical chapter. It should be noted that the dredging will be located within an already highly turbid area (the Study Area is within the most turbid area of the Thames[31]).
3.4.7	Water quality and release of contaminants (marine mammals) - construction and operation	*"The Scoping Report does not quantify the volume or type of contaminants that would be carried on board vessels or provide any detail regarding an accident management plan.*	Accidental contaminant release from vessels whilst moored during the operation phase will be mitigated through the EPRP that the DCO will require to be produced. An OEPRP will be

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		In the absence of sufficient information to confirm the absence of a pathway for significant effects on marine mammals, or evidence demonstrating clear agreement with relevant statutory bodies, the Inspectorate is not in a position to agree to scope this matter out from the assessment. *Accordingly, the ES should include an assessment of impacts from changes to water quality and release of contaminants on marine mammals, or information to demonstrate agreement with the relevant consultation bodies and the absence of a LSE."*	prepared and submitted alongside the application for development consent. A preliminary assessment of the likely impacts of water quality and the release of contaminants on marine mammals during construction and operation have been assessed in **Section 8.8**.
3.4.8	Noise and vibration (Medway Estuary MCZ, the River Thames and its Tidal Tributaries (SINC), marine habitats, intertidal and subtidal benthic communities and marine plants and macroalgae) - construction and operation	*"The Inspectorate agrees that flora associated with these designated sites and habitats can be scoped out of further assessment.* *However, an assessment of noise and vibration impacts on fish and marine mammals during construction and operation is proposed. This should include impacts on spawning and migrating fish (including those associated with the River Thames and its*	Details of noise propagation associated with the Proposed Scheme have been detailed in **Chapter 6: Noise and Vibration (Volume 1)**. A preliminary assessment of the likely effects of noise and vibration on marine mammals and fish (including those associated with the River Thames and its Tidal Tributaries SINC) during construction and operation have been assessed in **Section 8.8** of this chapter.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		Tidal Tributaries SINC) where significant effects are likely."	
3.4.9	Lighting – effects on the Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC), marine habitats, subtidal and intertidal benthic communities, marine plants and macroalgae marine mammals and Invasive Non-Native Species (INNS) - construction and operation	*"The Scoping Report does not provide sufficient information regarding the location, duration and type of lighting that will be deployed, and therefore, the Inspectorate does not consider that this matter may be scoped out of the assessment. The ES should either provide information to demonstrate the absence of a pathway for significant effects or present an assessment of likely significant effects on these receptors resulting from lighting."*	As outlined in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, construction lighting will be managed to minimise the lighting impacts during the construction phase. Where practicable, the lighting will face away from sensitive receptors. The type of lighting used for different tasks will vary depending on the nature of those tasks and will be commensurate with the construction activities being undertaken. Once operational, site lighting infrastructure including lighting columns will be required, as will security infrastructure including closed-circuit television (CCTV). An Outline Lighting Strategy will be developed and included within the application for development consent. A preliminary assessment of the likely effects of lighting during construction and operation have been assessed in **Section 8.8** of this technical chapter.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.4.10	Vessel strikes (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC), marine, habitats, subtidal and intertidal benthic communities, marine, plants and macroalgae, fish and INNS) - construction and operation	*"The Inspectorate agrees that this matter can be scoped out."*	No response required.
3.4.11	Changes in suspended sediment concentrations and subsequent sediment deposition on the benthic environment (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC), subtidal and intertidal benthic communities, marine plants and macroalgae; fish, marine mammals and INNS) - operation	*"The Report does not provide details to justify this approach, such as the volumes and frequency of disturbed sediment, vessel types and nature of movements. Therefore, the Inspectorate does not agree to scope this matter out."*	Periodic maintenance dredging will be required to ensure the Proposed Jetty remains accessible. The volumes and frequency of the maintenance dredging will depend on the final design of the Proposed Jetty. Further detail on the maintenance dredging required will be assessed and presented in the ES. As outlined in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** once operational up to five marine vessels will call at the Proposed Jetty each week to collect and transport LCO_2. To accommodate changes in vessel types, the Proposed Jetty will be designed to accommodate marine vessels with a capacity of up to 15,000m^3 per vessel, which would result in a lower number

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			of calls per week than the five referenced above. There will also be up to ten tug movements from the rear of the structure of the Proposed Jetty. A preliminary assessment of the likely impacts of changes in suspended sediment concentrations and subsequent sediment deposition on sensitive receptors during operation have been discussed in **Section 8.8** of this chapter.
3.4.12	Increased wave wash (marine plants and macroalgae, fish, marine mammals and INNS) - construction and operation	*"The Scoping Report does not contain information regarding the existing number of vessel movements using this section of the River Thames.* *The Scoping Report states that up to five vessels will arrive at the site per week, which equates to ten vessel movements per week and 520 additional vessel movements per year. In other sections of the Scoping Report, the implementation of reduced vessels speeds is suggested, but no information is provided as to what speed is recommended or the mechanism by which it would be secured.*	The Proposed Jetty will be designed to accommodate marine vessels with a capacity of up to 15,000m^3 per vessel. As detailed in **Appendix 19-1: Preliminary Navigation hazard Analysis (Volume 3)** total annualised east downstream transits were 9,828, and west transits were 9,480. Total upstream annualised transits were 11,688 for east and 11,688 for west. Vessels used during construction and operation will be travelling at a lower speed than most vessels that have previously passed the area and likely at a similar speed to previous tug and barges.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		The Inspectorate is therefore not in a position to scope this matter out. The ES should assess impacts from increased wave wash on marine plants and macroalgae, fish, marine mammals and INNS (including on the intertidal foreshore (a BAP priority habitat), during construction and operation, where significant effects are likely."	A preliminary assessment of the likely effects of increased wave wash on sensitive receptors in this context have been assessed in **Section 8.8** of this chapter.
3.4.13	INNS	*"The Scoping Report states that INNS are likely to be present within the site boundary. The ES should explain any mitigation measures or biosecurity precautions required to prevent the spread of INNS. Any measures relied upon in the ES should be discussed with relevant consultation bodies, including Natural England and the Environment Agency, in effort to agree the approach. Measures relied upon in the ES should be adequately secured."*	The ES and the OCoCP, prepared as part of the application for development consent, and the OEMP, which will be prepared prior to the Proposed Scheme commencing operation, will include mitigation measures and biosecurity precautions required to prevent the spread of INNS. These measures will be discussed with relevant consultation bodies i.e., Natural England, The Environment Agency and the Port of London Authority.
3.4.14	Fish Spawning	*"The Scoping Report states that consideration will be given to the timings of construction activities to avoid fish migration and spawning. The Inspectorate advises that effects from maintenance/ dredging activities on fish migration and spawning should also be considered and that the ES should refer to*	Mitigation measures regarding sensitive fish periods have been included within **Section 8.7** of this chapter. The OEMP will be the mechanism by which timing of activities will be controlled for operational activities (including maintenance dredging). The OEMP will be prepared prior to the Proposed

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		the mechanism by which timing of activities will be controlled."	Scheme commencing operation and required through the DCO.
3.4.15	Belvedere Power Station Jetty	*"The Scoping Report states that the Belvedere Power Station Jetty will need to be decommissioned and dismantled. The ES should include an assessment of likely significant effects resulting from removal of the jetty, such as additional vessel movements and potential habitat loss/ change including loss of roosting structures."*	A preliminary assessment of impacts of demolition or retention of the Belvedere Power Station Jetty (disused) on marine receptors have been assessed in **Section 8.8** of this chapter. A full assessment of the impacts of the demolition/retention of the Belvedere Power Station Jetty (disused) will be undertaken in the ES, as the design develops further.
3.4.16	Shellfish	*"The ES should identify any potential impacts on shellfish and provide an assessment of any likely significant effects on these species."*	Records from the desk study and results from the intertidal and subtidal benthic surveys state that shellfish of conservation and commercial importance are unlikely to be present within Study Area of the Proposed Scheme. Furthermore, the nearest Classified Bivalve Mollusc Harvesting Area and Shellfish Waters are located approximately 39.6km downstream of the Proposed Scheme. Therefore, potential impacts to shellfish are scoped out of further assessment.
3.3.16	European eel surveys and water supply	*"Paragraph 6.3.36 of the Scoping Report states that "it can be assumed that European eel may be present within the site". The*	Although European eel breed in freshwater, the transboundary nature of their ecology means they inhabit both marine and

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		Scoping Report identifies a number of ditches on and around the site and explains that surveys will be undertaken in these ditches for aquatic macroinvertebrates and macrophytes. The ES should confirm that surveys of the ditches have been undertaken for European eels which may use this habitat or justify why these are not required, in agreement with relevant consultees. The Applicant should consider the use of an Eel Recovery Plan. *The ES should confirm where the water supply required for the Proposed Development will be derived from. If water from the Thames River will be used, then additional components may be required such as fine mesh and low velocity intake screening in order to prevent adverse effects to fish including European eels."*	freshwater environments[32]. European eel has therefore been covered in both **Chapter 7: Terrestrial Biodiversity (Volume 1)** (for their freshwater phase) and **Chapter 8: Marine Biodiversity (Volume 1)** (for their marine phase). The points raised by the Planning Inspectorate's response 3.3.16 are covered in both technical chapters. **Chapter 2: Site and Proposed Scheme Description (Volume 1)** describes the water supply required for the Proposed Scheme. This will not involve abstraction from the River Thames.
Environment Agency			
Noise and Vibration Chapter	Noise and vibration have been scoped in for marine mammals and fish, apart from that caused by vessel movements.	*"The EA agree to scope in underwater noise for marine mammals and fish.* *The marine works are likely to require piling. Fish populations and migratory fish have the potential to be adversely impacted by piling*	Noise levels and their effects on marine mammals and fish will be taken into account as the design progresses and will be considered within the ES.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		noise and this will need to be addressed. Disturbance from piling activities during construction, may well be significant in terms of disturbance or delay to migratory activity, or adverse impacts from direct physical injury to less motile fish species or life stages. The extent of any piling noise will need to be assessed in terms of its propagation across the whole river channel and any acoustic barrier to migratory activity or associated risks to fish. *Avoiding sensitive periods and selecting non-percussive piling methods are typically used to mitigate adverse impacts on fish communities in the Thames."*	A preliminary assessment of the likely impacts of noise and vibration on marine mammals and fish have been assessed in **Section 8.8** of this chapter. Embedded and additional mitigation measures are included in **Section 8.7** and **Section 8.9** of this technical chapter respectively, and they consider the impacts resulting from noisy activities such as piling).
7.3.43	N/A	*"Environment Agency Transitional and Coastal (TraC) fish monitoring site at West Thurrock will also provide an indication of species that may be present in low flow periods."*	Fish data available for the West Thurrock site has been added to the baseline text in **Section 8.6**. The site is located approximately 13km downstream of the Study Area.
7.3.48	N/A	*"Sprats and Herring are regularly caught downstream at the Environment Agency TraC site at West Thurrock. During low flow years, when salinity increases upstream, it is likely that they may be present in the development*	Noise levels derived from construction activities and their effects on fish (including consideration of species sensitivity) will be addressed as the design progresses and will be provided within the ES.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		area. As a hearing specialist species, this should be considered in the noise and vibration assessment for fish. Whilst spawning will not occur, these species will be using the environment in this area affected by the development."	A preliminary assessment of the likely impacts of noise and vibration on fish derived from operational activities have been assessed in **Section 8.8** of this chapter.
7.3.51	N/A	*"European eel are abundant throughout Halfway Reach and were previously commercially exploited (via an authorised fyke net fishery) in this area. Juvenile glass eels will be migrating past the project site from late March onwards, whilst adult silver eels will be returning to sea from October onwards. There are also large numbers of eel resident in this area. For these reasons, the EA would apply the Eel Regulations 2009 fully if considering any proposal for any new abstraction of water from the tidal river."*	As discussed in **Chapter 3: Consideration of Alternatives (Volume 2),** there are no plans for abstraction of water from the Thames associated with the Proposed Scheme. The Eel Regulations[33] have been, and will continue to be, taken into consideration for all aspects of the Proposed Scheme.
7.3.52	N/A	*"All of these species are known to be present and migrating through the Tideway. Environment Agency TraC fish monitoring tends not to pick up on these species, as it is primarily targeting juvenile fish. Additionally, sampling may not occur when these species are present. Historic monitoring, which included power station screen and fish traps*	The potential presence of these species has been considered in **Section 8.6** of this chapter and preliminary assessment of the likely impacts is included within **Section 8.8** of this chapter.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		sampling has shown that low numbers of salmon and the more abundant sea trout are present and are occasionally caught by recreational anglers. Twaite (and possibly Allis) shad have been observed, with captures of juvenile fish made during fish rescues during the Tideway Tunnel works, and scientific sampling in the Mucking area. These species are therefore known to be present in the estuary, although their behaviour and movements is not yet understood. River and sea lamprey are also known to be present, with spawning populations in the Medway estuary, it is likely that they are beginning to return to the Thames."	
7.6.2	N/A	*"Avoidance of sensitive periods for fish species for dredging and piling operations is likely to be a key mitigation measure and should be clearly stated in the CoCP. There should be a justification for any use of percussive piling methods, in order to demonstrate that silent or vibro piling is not technically feasible."*	This information will be included in mitigation measures stated within the ES and is included within **Section 8.7** of this chapter. Piling methods will be determined as the design progresses and will be provided within the ES.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
7.7	The Scoping Report[34] states the effects of loss or disturbance of habitat on marine mammals and fish should be scoped out.	*"We disagree that loss or disturbance of habitat (fish and marine mammals) should be scoped out at the stage. Whilst designated sites may not be directly affected, fish will be impacted by the scheme and appropriate mitigation and/or compensation for loss of physical habitat will need to be identified and agreed. E.g., loss of intertidal areas of vegetated margins. This should be addressed within the PIER."*	A preliminary assessment of the likely impacts of loss or disturbance of habitat on fish and marine mammals have been assessed in **Section 8.8** of this chapter. Additional mitigation measures are included in **Section 8.9** of this chapter.
London Borough of Bexley			
N/A	Marine Biodiversity	*"The Council has no expertise in this subject and will therefore leave it up to other Statutory Bodies to comment on this chapter of the Scoping Opinion.".*	Please see responses to comments from other Statutory Bodies within **Table 8-2**.
Port of London Authority			
7.6	N/A	*"Section 7.6 on Design, Mitigation and Enhancement Measures includes some information on embedded mitigation measures during the construction phase including:* • *Confirming the need for an Ecological Clerk of Works (ECoW) to be present during dredging/piling; and*	Mitigation measures to minimise potential effects to marine receptors will be recorded in the OCoCP to be submitted as part of the application for development consent. Mitigation measures will consider the potential impacts upon construction techniques and their practicality, as well as potential impacts upon marine ecology in

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		• *Implementation of reduced vessel speed to minimise impact on intertidal habitats from wash.* *To highlight, by proposing embedding mitigation before an assessment of its need has been carried out, this has a potential effect to restrict the applicant in their construction and operational phases without any assessed benefits."*	order to balance them appropriately. The OCoCP will include mitigation measures associated with dredging/piling and vessels speeds during the construction phase. Operational mitigation measures will be set out in the OEMP, which will be prepared prior to the Proposed Scheme commencing operation and be secured by a DCO requirement.
Table 7-7	N/A	*"Within table 7-7 of this chapter, for impacts scoped in or out of further assessment, it is noted that noise and vibration (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC), marine habitats, intertidal and subtidal benthic communities and marine plants and macroalgae) have been scoped out. To confirm, one of the reasons the River Thames and its Tidal Tributaries SINC was designated, was because of the rivers importance for spawning and migrating fish. Therefore, noise and vibration have the potential to affect the migration and spawning of fish, and consideration should be given to scoping this in for the ES."*	Effects from noise and vibration on fish during construction and operation were scoped in within the Chapter 7: Marine Biodiversity of the Scoping Report[34]. Noise levels derived from construction activities and their effects on fish will be determined as the design evolves and will be presented within the ES. At this stage a preliminary assessment has been undertaken on the likely effects of noise and vibration on marine mammals and fish derived from operational activities, this is presented in **Section 8.8** of this chapter.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
7.6.3	N/A	*"Paragraph 7.6.3 includes a statement with regard to habitat creation, including on the potential creation of new areas to replace those that may be lost as a result of the Proposed Scheme, and that if this cannot be completed on site, potential alternative options may include offsetting or creation of a compensation site. Further detail on this will be required as the scheme develops, including on whether any potential habitat creation is proposed within, or outside of the red line boundary."*	A BNG assessment for the Proposed Scheme will be submitted as part of the application for development consent. The BNG assessment will include details on the potential creation of new areas to replace those that may be lost as a result of the Proposed Scheme. The PLA, Environment Agency and MMO will be kept updated with ongoing evolution of the BNG assessment.
1.1.9	N/A	*"Paragraph 1.1.9 states that further work is being undertaken in respect of the ecological mitigation areas that may be required for the Proposed Scheme, which may expand the Site Boundary. The PLA must be kept informed on how this is progressed."*	At this stage there is no intention to expand the Site Boundary to account for marine ecological mitigation. The PLA, Environment Agency and MMO will be kept updated with ongoing evolution of the BNG assessment.
7.7.2	N/A	*"Paragraph 7.7.2 makes reference to the long-term loss of subtidal and intertidal habitat from the new footprint of the Proposed Jetty and maintenance dredging. Here, it is considered that there will also need to be full consideration of habitat changes as a result of the decommissioning and dismantlement of*	A preliminary assessment of the likely impacts of demolition of the Belvedere Power Station Jetty (disused) on marine receptors has been included in **Section 8.8** of this chapter. A full assessment of the impacts of the demolition/retention of the Belvedere Power

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		the existing Belvedere Power Station Jetty as part of the Proposed Scheme, as referenced in Paragraph 18.3.5."	Station Jetty (disused) will be undertaken in the ES, as the design develops further.
7.7.8	N/A	*"It is welcomed in paragraph 7.8.3 that the proposed assessment methodology on Marine Biodiversity will be discussed, and agreement sought with various relevant agencies including the PLA."*	No response required.

8.3.2. **Table 8-3** provides a summary of the consultation and engagement undertaken to inform the marine biodiversity assessment to date.

Table 8-3: Marine Biodiversity Consultation and Engagement Summary

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
13th April 2023, Meeting	Environment Agency	**Key Topics:** • Marine Biodiversity Net Gain (BNG). • Type of licenses/ scope of surveys. • Marine Benthic Ecology (encompassing shellfish, INNS, the mudflat and river wall survey; and supporting information for a WFD and the Habitat Assessment). • Confirmation of approach to grab sampling for macrobenthos and fish surveys. **Key Outcomes:** • No concerns identified with the marine biodiversity methodology. Content with sampling methodology and locations. • Agreed the BNG will focus on the intertidal area of the Proposed Scheme and not the subtidal area.
22nd September 2023	Natural England	**Key Topics:** • Overview of the construction works within the marine environment, including the loss of intertidal and subtidal habitat. **Key Outcomes:** • Natural England did not provide any comments on this at the time.

8.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

8.4.1. The marine biodiversity assessment of the Proposed Scheme has been undertaken in line with the legislation, policy and guidance described in **Section 8.2**.

POTENTIAL SIGNIFICANT EFFECTS

8.4.2. As set out in the EIA Scoping Report[34] and following receipt of the EIA Scoping Opinion[28], the following effects are considered to be significant and therefore have been considered further in this assessment:

- Construction Phase:
  - Loss or disturbance of habitat (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC), marine habitats, intertidal and subtidal benthic communities, marine plants and macroalgae, fish and marine mammals).
  - Water quality and release of contaminants (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC) marine habitats, intertidal and subtidal benthic communities, marine plants and macroalgae, fish and marine mammals).
  - Noise and vibration (Medway Estuary MCZ (fish), The River Thames and its Tidal Tributaries (SINC) (fish) fish and marine mammals).
  - Lighting ((Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC) marine habitats, intertidal and subtidal benthic communities, marine plants and macroalgae, fish and marine mammals).
  - Vessel strikes (marine mammals).
  - Change in suspended sediment levels and subsequent sediment deposition on the benthic environment (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC), subtidal and intertidal benthic communities and marine plants and macroalgae).
  - Increased wave wash (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC) and subtidal and intertidal benthic communities);
  - Increased wave wash (marine plants and macroalgae, fish, marine mammals and INNS).
  - Spread of INNS (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC) and subtidal and intertidal benthic communities, marine plants and macroalgae, fish).
- Operation Phase:
  - Loss or disturbance of habitat (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC), marine habitats, intertidal and subtidal benthic communities, marine plants and macroalgae, fish and marine mammals).
  - Water quality and release of contaminants (marine habitats, intertidal and subtidal benthic communities, marine plants and macroalgae and fish).
  - Water quality and release of contaminants (marine mammals).
  - Noise and vibration (Medway Estuary MCZ (fish), The River Thames and its Tidal Tributaries (SINC) (fish) fish and marine mammals).
  - Lighting (fish).
  - Vessel strikes (marine mammals).

- Changes in suspended sediment concentrations and subsequent sediment deposition on the benthic environment (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC), subtidal and intertidal benthic communities, marine plants and macroalgae, fish, marine mammals and INNS).
- Increased wave wash (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC) and subtidal and intertidal benthic communities).
- Increased wave wash (marine plants and macroalgae, fish, marine mammals and INNS).
- Spread of INNS.

MATTERS SCOPED OUT

8.4.3. The following effects are scoped out of this assessment:

- Construction:
  - Noise and vibration (marine habitats, intertidal and subtidal benthic communities and marine plants and macroalgae).
  - Lighting (INNS).
  - Vessel strikes (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC)).
- Operation:
  - Noise and vibration (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC), marine habitats, intertidal and subtidal benthic communities and marine plants and macroalgae).
  - Lighting (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC), marine habitats, subtidal and intertidal benthic communities, marine plants and macroalgae marine mammals and INNS).
  - Vessel Strike Marine Mammals.

SENSITIVE RECEPTORS

8.4.4. The following likely sensitive receptors have been identified:

Nationally Designated Sites

- Medway Estuary MCZ (Zone 1 & 2 Boundary).

Non-statutory Designated Sites

- The River Thames and its Tidal Tributaries (SINC).

Thames Middle Habitats and Species (associated with the Thames Middle Transitional Water Body (GB530603911402))

- Intertidal benthic communities and its associated benthic communities;
- Subtidal benthic communities and its associated benthic communities;
- Marine plants and macroalgae;
- Fish; and
- Marine mammals (including grey seals, harbour seals and harbour porpoises).

INNS

8.4.5. Construction and operational activities have the potential to result in the spread of invasive non-native species through vessel movements and construction activities.

BASELINE DATA COLLECTION

8.4.6. The key desk-based sources of information on baseline marine biodiversity conditions are:

- Natural England's Magic map application[35];
- Open source 1:25,000 Ordnance Survey datasets[36];
- Environment Agency Catchment Data Explorer[37];
- Environment Agency Ecology and Fish Data Explorer[38];
- Estuaries Edges Case Studies[3939]
- Zoological Society of London (ZSL) and Thames Ecology Research Programme resources[40,41,42,43,44,45,46,47,48],
- Environment Agency Water Quality Archives[49];
- London Borough of Bexley (LBB) Sites of Importance for Nature Conservation Report[50],
- Available grey literature and technical reports for projects on the Thames [51,52,53,54,55,56,57,58,59,60,61,62,63,64,65] ; and
- International Union for Conservation of Nature (IUCN) Red List[66].

8.4.7. Marine biodiversity survey work is underway. The surveys that are being undertaken comprise:

- intertidal walkover surveys;
- fish surveys; and
- subtidal and intertidal benthic macrofaunal surveys.

8.4.8. A summary of each of the surveys is provided below.

Intertidal Walkover Surveys

8.4.9. Site visits were undertaken on 4th November 2022 and 17th May 2023. The survey was undertaken according to standard intertidal survey methodologies as outlined in the Joint Nature Conservation Committee (JNCC) Marine Monitoring Handbook[67]. There was no safe access to the intertidal area during the walkovers and therefore all observations were made from England Coast Path adjacent to the intertidal area. The surveys were conducted on an outgoing tide, starting approximately two hours prior to low tide and finishing approximately one hour after low tide.

8.4.10. The surveys comprised a general walkover noting changes in ecological and physical characteristics. All conspicuous macrofauna species present were identified and recorded onsite. All species names were taken from the Marine Life Information Network[68]. Field notes were also taken on the physical characteristics, including sediment type, shore type and wave exposure, alongside photographs. Any other features within the intertidal zone were also noted including artificial structures and habitats/species of conservation importance.

Fish Surveys

8.4.11. A spring fish survey was undertaken on the 18th May 2023. Two 2m scientific beam trawl transects were carried out within the Study Area (described in **Section 8.5**). Each beam trawl transects extended over a minimum distance of 200m, with the start and end points recorded using a Global Navigation Satellite System (GNSS) logger. On retrieval of the beam trawl, all fish were carefully handled, identified to species level (where practicable), counted and fork length measured to the nearest mm. Once processed, fish were returned safely to the River Thames. Locations of the beam trawl transects are detailed in **Table 8-4 and Figure 8-2: Trawl Sample Locations and Survey Area (Volume 2)**.

Table 8-4: Location of Fish Beam Trawls

Station Number	Latitude (WGS84)	Longitude (WGS84)
Trawl 1 Start Point	51°30.4938	0°09.2300
Trawl 1 End Point	51°30.4302	0°09.4741
Trawl 2 Start Point	51°30.3737	0°09.6806
Trawl 2 End Point	51°30.3564	0°09.7742

8.4.12. The autumn fish survey will be undertaken in September 2023 at the same locations as the spring survey and will be used to characterise the fish community composition with the Study Area.

Subtidal and Intertidal Benthic Survey

8.4.13. On the 17th May 2023, grab sampling was carried out at six points across the intertidal zone and on the 18th May 2023, sampling was carried out at another six points across the subtidal area. All sampling was undertaken from survey vessels. Locations of the sampling stations are detailed in **Table 8-5** and **Figure 8-3: Intertidal and Subtidal Sample Locations and Survey Area (Volume 2)**.

8.4.14. The intertidal and subtidal benthic surveys followed the established and recognised procedures outlined in the Recommended Operational Guidelines (ROG) for Grab Sampling and Sorting and Treatment of Samples[69] and the Marine Monitoring Handbook, Procedural Guideline No 3.9[70].

8.4.15. Subtidal and intertidal samples were collected using a 0.1m^2 day grab at the six stations for macrofauna analysis (faunal composition, abundance and biomass) and elutriated and sieved over a 0.5mm stainless steel mesh sieve. An additional sample was taken at each station for determination of Particle Size Analysis (PSA) and sediment chemistry analysis.

8.4.16. The benthic invertebrate samples were analysed by an accredited Marine Biological Analytical Quality Control (NMBAQC) laboratory. All the macroinfaunal specimens were identified to species level (where practicable) and enumerated.

8.4.17. The PSA and sediment chemistry samples were analysed by an accredited physico-chemical laboratory to MMO dredging standards.

Table 8-5: Location of Intertidal and Subtidal Benthic Sampling Stations

Station Number	Latitude (WGS84)	Longitude (WGS84)
Intertidal Surveys		
Intertidal 1	51°30′24″N	000°09′08″E
Intertidal 2	51°30′23″N	000°09′15″E
Intertidal 3	51°30′22″N	000°09′22″E
Intertidal 4	51°30′21″N	000°09′30″E
Intertidal 5	51°30′21″N	000°09′36″E
Intertidal 6	51°30′18″N	000°09′49″E
Subtidal Surveys		
Subtidal 7	51º30.4907	000º09.1677
Subtidal 8	51º30.3741	000º09.5448
Subtidal 9	51º30.4281	000º09.5176
Subtidal 10	51º30.4087	000º09.6488
Subtidal 11	51º30.3306	000º09.8323
Subtidal 12	51º30.4017	000º09.5685

ASSESSMENT METHODOLOGY

8.4.18. The EIA will be prepared in line with current good practice from CIEEM's Guidelines for Ecological Impact Assessment[71], in addition to the specific methodology detailed in **Chapter 4: EIA Methodology (Volume 1)**. Each receptor will be evaluated within the geographic scale of reference and against potential impacts from the construction and operation phases of the Proposed Scheme.

8.4.19. For adverse impacts, CIEEM's Guidelines[71] for Ecological Impact Assessment [71] has been adapted to classify the magnitude, value and sensitivity of impacts by a matrix approach to determine significance of effects. This is based on the approach used for road schemes in the UK by the Design Manual for Roads and Bridges[72]. Although the Proposed Scheme does not comprise of a road/bridge to which the public has access, this guidance provides a robust methodology for assessing impacts to marine biodiversity and is considered suitable for this assessment.

8.4.20. This methodology will be used to assess both the construction and operation phases of the Proposed Scheme.

Significance Criteria

Magnitude

8.4.21. The magnitude relates to the level of change that the receptor will be receiving compared to the baseline conditions, using the duration of the impact, timing, scale, size and frequency to determine the magnitude of the impact to each receptor. Magnitude of impact is evaluated in accordance with the definitions set out in CIEEM's Guidelines[71] for Ecological Impact Assessment [71], summarised in **Table 8-6** below.

8.4.22. The following characteristics will be used to assess the magnitude of the impact on ecological features as a result of the Proposed Scheme:

- type of impact – beneficial or adverse;
- extent or spatial scope of the impact;
- reversibility of impact – whether the impact is naturally reversible or reversible through mitigation measures;
- timing and frequency of the impact, in relation to ecological changes; and
- likely duration of the impact – short term (< 1 year), medium-term (1 - 5 years) or long term (5 or more years).

Table 8-6: Marine Biodiversity Definitions of Impact Magnitude Classes

Magnitude of Impact	Definition
High	Total loss or large alteration to key elements/features of the baseline conditions. Results in extensive temporary or permanent changes to baseline conditions such as spawning/nursery/feeding grounds and/or migratory routes.
Medium	Partial loss or alteration to one or more key elements/features of the baseline conditions.
Low	Small shift away from baseline conditions. No noticeable effects above the level of natural variation experienced.
Negligible	Very slight change from baseline conditions.

Value and Sensitivity

8.4.23. As described within **Chapter 4: EIA Methodology (Volume 1)**, sensitivity is a means to measure how affected receptors/processes and/or the receiving environment is likely to respond to change. The sensitivity is assigned at the receptor/process level. This may be defined in terms of quality, value, rarity or importance, and be classed as International, UK/National, Regional/County, District, Local.

8.4.24. **Table 8-7** summarises the ecological feature conservation value and/or sensitivity adapted from CIEEM's Guidelines for Ecological Impact Assessment[71] for habitats and species, which has been adapted for use in this assessment. CIEEM use the term "Importance" to reflect value and sensitivity, and this term has been adopted.

Table 8-7: Marine Biodiversity Definitions of Impact Magnitude Classes

Value/Sensitivity (Importance)	Criteria
International (very high)	**Habitats** • an internationally designated site or candidate site SPA, candidate SPA, SAC, candidate SAC, SCI, Ramsar Site) or an area that would meet the published selection criteria for designation; and • a viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat, which are essential to maintain the viability of a larger whole. **Species** • a sustainable population of an internationally important species or species listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP) which is listed in Annex IV of the Habitats Directive, or as being of unfavourable conservation status in Europe, of uncertain conservation status or of global conservation concern in the UK BAP; • sites supporting a spawning population of such a species or supplying a critical element of their habitat requirements; and • species present within the Study Area that are likely to be rare with minimal potential for substitution or unable to tolerate change.
UK/National (high)	**Habitats** • a nationally designated site, SSSI, NNR, Marine Nature Reserve, MCZ or a discrete area, which would meet the published selection criteria for national designation (e.g., SSSI selection guidelines); and • a sustainable area of a priority habitat identified in the UK BAP, or of smaller areas of such habitat which are essential to maintain the viability of a larger whole. **Species** • any regularly occurring/large population of a nationally important species (e.g., Red Data List[73]); • a large population of a species identified as a SPI;

Value/Sensitivity (Importance)	Criteria
	• a species population that would qualify for SSSI designation; • Nationally Important Marine Features; and • species that have spawning or nursery areas within the Study Area that are important nationally (e.g., may be primary spawning/nursery area for that species).
Regional/County (medium)	**Habitats** • viable areas of key habitat identified in county/district BAPs, or smaller areas of such habitat which are essential to maintain the viability of a larger whole; • sites recognised by local authorities, e.g., Local Wildlife Sites (LWS); and • county sites that the designating authority has determined meet the published ecological selection criteria for designation. **Species** • a regularly occurring, locally significant number of a nationally important species; • any regularly occurring, locally significant population of a SPI or a species listed in a county/district BAP (where available); • a regularly occurring, locally significant population of a county/district important species; • sites supporting populations of internationally/nationally/regionally important species that are not threatened or rare in the region or county, and not integral to maintaining those populations; • sites/features scarce in the county or that appreciably enrich the county habitat resource; • species that are of commercial value to the fisheries which operate within the Thames; • species that have spawning or nursery areas within the Study Area that are important regionally (i.e., species may spawn in other parts of the UK, but their key spawning area is within the Thames as the region of interest); and • species that have some ability to tolerate change and recover in the medium term.

Value/Sensitivity (Importance)	Criteria
District (Low)	**Habitats** • areas of habitat that appreciably enrich the local habitat resource. **Species** • assemblages of species that appreciably enrich the biodiversity resource within the local context; sites supporting populations of county/district important species that are not threatened or rare in the region or county and are not integral to maintaining those populations; and • species able to tolerate the effect to a large extent, with a relatively rapid rate of recovery.
Local (Negligible)	**Habitats** • common and widespread habitat, not meeting any of the above criteria; and • areas of heavily modified habitat or habitats of low species diversity or low value as habitat to species of nature conservation interest. **Species** • common and widespread species, not meeting any of the above criteria; • commonplace feature of little or no habitat/historical significance; • loss of such a feature would not be seen as detrimental to the ecology of the area; • species that are of commercial importance but do not form a key component of the assemblages within the Study Area; • the spawning/nursery area for the species are outside of the Study Area; and • species that have a high tolerance to change and can accommodate a particular effect without the need to recover or adapt.

Significance

8.4.25. The overall significance of effect has been assessed using the matrix shown in **Table8-8** which has been modified to align with **Chapter 4: EIA Methodology (Volume 1)**. This uses sensitivity/value of the receptor and magnitude of impact to determine significance. Where a range of significance of effect is identified the final assessment for each effect is based upon professional judgement.

8.4.26. In accordance with **Chapter 4: EIA Methodology (Volume 1)** any effects with a significance level of Moderate or above will be concluded to be significant.

Table 8-8: Significance of Effects Matrix

		Magnitude of Impacts			
		High	**Medium**	**Low**	**Negligible**
Value /Sensitivity	**International**	Major	Major to Moderate	Moderate	Negligible
	UK/National	Major	Major to Moderate	Moderate	Negligible
	Regional/ County	Major to Moderate	Moderate	Minor to Moderate	Negligible
	District	Moderate	Minor to Moderate	Minor	Negligible
	Local	Minor	Minor	Negligible	Negligible

8.5. STUDY AREA

8.5.1. For the assessment of impacts during construction and operation, the Study Areas for potential sensitive receptors are set out in **Table 8-9**. This approach is consistent with current good practice guidelines published by the CIEEM[71].

8.5.2. The assessment will consider the likely significant effects of the Proposed Scheme on ecological features within its Zone of influence (ZOI). ZOI is a term used in CIEEM guidance[71] which has been used in this chapter interchangeably with the term Study Area. The ZOI/Study Area is the area over which marine biodiversity features may receive impacts from the Proposed Scheme. It covers the area within the Site Boundary and the wider landscape, where pathways exist for the transfer of impacts away from the Site.

8.5.3. The sensitivity of marine biodiversity features present is also taken into account when determining the ZOI, as it will be greater where more sensitive marine biodiversity features are present. The ZOI for the Proposed Scheme have been determined by:

- consideration of the activities during construction and operation associated with the Proposed Scheme and the scale of the works;
- the hydrological flows within the Thames, to determine potential upstream and downstream effects;
- the duration and timing of the works; and
- marine biodiversity data, including the use of online inventories of designated sites and habitats, aerial photography and OS mapping, records of protected and notable species, and findings from survey work.

8.5.4. The ZOI is the same for marine biodiversity for both the construction and operation phases. This is due to the requirements for capital and maintenance dredging, as well as vessel movements for both construction and the operational phase of the Proposed Scheme.

8.5.5. The ZOI are shown on **Figure 8-1: Marine Biodiversity Study Areas (Volume 2).**

Table 8-9: Marine Biodiversity Zone of Influence

Receptor	Zone of Influence
Nationally Designated Sites	Within 15km of the Site Boundary, extended if there is a designated feature(s) of a particular site that is highly mobile and consequently can be present within the vicinity of the Site Boundary.
Non-statutory Designated Sites	Within 2km of the Site Boundary, extended if there is a designated feature(s) of a particular site that is highly mobile and consequently can be present within the vicinity of the Site Boundary.
Thames Middle Habitats and Species (excluding fish and marine mammals)	Within 250m of the Site Boundary.
Fish	Within 10km of the Site Boundary, extended for species that display high mobility, such as migratory species.
Marine Mammals	Within 10km of the Site Boundary.
INNS	Within 250m of the Site Boundary.

8.6. BASELINE CONDITIONS AND FUTURE BASELINE

DESK STUDY BASELINE

8.6.1. This marine ecology baseline was produced using the most up to date and relevant data sets both spatially and temporally. Some of the desk study data is over 18 months old, and where this is applicable, Site specific surveys have been undertaken to update this baseline information. It should be noted that although, some of the data sources are over 18 months old, they still provide a valuable insight to the marine ecology within the Study Area.

Nationally Designated Sites

8.6.2. The nationally designated site included in this preliminary assessment, beyond 15km, that lists marine features as a reason for its designation and has functional hydrological links to the Site Boundary is:

- Medway Estuary MCZ Zone 1 & 2 (approximately 25km southeast of the Site Boundary).

Non-statutory Designated Sites

8.6.3. The nationally designated site included in this preliminary assessment is The River Thames and its Tidal Tributaries SINC. The Site Boundary directly overlaps with The River Thames and its Tidal Tributaries SINC. This SINC, which encompasses tidally influenced areas from Dartford Marshes to Molesley (2304.92ha in London, 392.97ha of which is within the LBB), is designated by the Greater London Authority (GLA) and is adopted by all boroughs that border the Thames. It recognises a range of estuarine habitats including mud flat, shingle beach, saltmarsh, reedbeds and the river channel[50]. Similarly, the LBB Local Biodiversity Action Plan (LBAP) includes rivers and streams as a priority habitat[9].

Thames Middle Habitats and Species

8.6.4. There is one WFD-designated water body located within the Study Area, the Thames Middle Transitional Water Body (GB530603911402). Alongside the main Thames channel, the Thames Middle Water Body also includes the tidal sections of several Thames tributaries, including the River Roding, River Lea (Lee), Deptford Creek and the River Darent. Any reference to the Thames Middle within this chapter is inclusive of the tidal section of these watercourses.

8.6.5. The 2019 WFD ecological status of this water body was classified as Moderate overall. Five biological quality elements are monitored in this water body, as detailed in **Table 8-10**[38].

Table 8-10: Classifications of WFD Biological Quality Elements, Thames Middle Water Body

Biological Quality Element	2019 WFD Classification
Angiosperms	Moderate
Saltmarsh (Sub Element)	Moderate
Fish	Good
Invertebrates	Good
Infauna Quality Index (Sub Element)	Good
Macroalgae	Good
Fucoid Extent (Sub Element)	Good
Opportunistic Algae (Sub Element)	High
Phytoplankton	Good

8.6.6. One WFD Higher Sensitivity Habitat, Intertidal Saltmarsh (A2.5), and one WFD Lower Sensitivity Habitat, Intertidal Soft Sediment (Sand, Mud & Mixed A2.2, A2.3, A2.4), are also present within the Site[35].

8.6.7. An overview of the habitats and species within the Thames Middle Water Body are provided below.

Marine Habitats

8.6.8. The Thames Middle Water Body features subtidal and intertidal habitats. The salinity regime within this section of the Thames Middle Water Body ranges from 5.55 parts per thousand (ppt) to 16.9 ppt (from Environment Agency Water Information Management System (WIMS) database monitoring station: Thames at Erith)[49].

8.6.9. The subtidal substrate within the Thames Middle Water Body is predominantly coarse sediment, sand and mud[50].

8.6.10. The intertidal habitat of the Thames Middle Water Body includes areas of shingle, reedbeds, saltmarsh and eelgrass beds. Extensive intertidal sand and mudflats are present, primarily consisting of fine, silty sediment. The mudflat fringes are known to become narrower further inland and wider further downstream towards the Outer Estuary.

8.6.11. DEFRA's Magic[35] mapping indicates the intertidal area within the Site Boundary features a narrow strip of intertidal soft sediment comprising mudflat (width of approximately 170m) and intertidal saltmarsh (width of approximately 40m)[35].

8.6.12. Intertidal mudflats are a UKBAP priority habitat that are also protected as a habitat of principal importance (HPI) under Section 41 of the NERC Act[15]. It is also included in the OSPAR Convention as a threatened and/or declining habitat.

8.6.13. Two site visits were undertaken on the 4th November 2022 and 17th May 2023 to determine the habitats present within the Study Area. The site visit determined the present of intertidal and subtidal mudflats, saltmarsh to the west of the site boundary, fucoids growing upon the base of the River wall and a thin strip of salt tolerant vegetation growing above the band of fucoids.

8.6.14. The section of the Thames Middle Water Body within the Study Area is constrained on both banks by artificial flood defences. The flood defences within the Study Area are comprised of a 45-degree angle smooth concrete wall with a vertical concrete capping piece. An area of intertidal mudflat extends approximately 70m from the base of the wall towards the low water point. An area of intertidal boulders dominated by wrack *Fucoid spp* and *Ulva spp* was also present within the mudflat area. On the upper shore, salt tolerant plants were observed, including primarily *Phragmites spp*.

Intertidal Benthic Communities

8.6.15. In order to produce the ecological baseline for the intertidal benthic communities within the Thames Middle Water Body, a combination of desk study and field surveys (as described in **Section 8.4** above) have been utilised.

8.6.16. Invertebrate species typically found within the intertidal zone in the brackish sections of the Thames Middle Water Body include polychaetes (or bristle worms) (such as ragworms *Nereis spp* and the spionidae *Streblospio shrubsolii*) and tubificid oligochaetes such as the marine worm *Limnodrilus hoffmeisteri* [40].

8.6.17. The macrofaunal community in the intertidal habitats at Thames Wharf (9km upstream of the Site Boundary) was surveyed in 2015[74,75]. The communities were highly impoverished with low species diversity. The assemblage featured oligochaetes, nematodes and gastropods, and was dominated by the marine worm *L. hoffmeisteri*. This species is commonly found in high densities in the upper Thames Estuary at enriched locations, such as adjacent of sewage outfalls.

8.6.18. The Crossness Sewage Treatment Works is located approximately 230m to the west of the Site Boundary (with a discharging outfall and storm drain)[76], and therefore it is likely that the marine worm *L. hoffmeisteri* will be present in high abundance at the Site.

8.6.19. The macrofaunal community recorded in 2015, at an Environment Agency TraC invertebrate monitoring site[6] located approximately 8km downstream of the Site Boundary, demonstrated similar community characteristics. The sample predominantly comprised oligochaetes, with low number of crustaceans, molluscs, and bryozoans. No protected or notable species were detected.

8.6.20. The tentacled lagoon worm *A. romijni* is a designated feature of the Swanscombe MCZ, located approximately 10km downstream of the Site Boundary. This species, which is found in the intertidal and subtidal soft sediments, is protected under Schedule 5 of the WCA[14] and is nationally scarce, being recorded in only 27 sites in the UK[14]. Due to the distance of the Swanscombe MCZ from the Site Boundary (approximately 10km) and the sessile nature of the tentacled lagoon worm (the MCZ's qualifying species), the Swanscombe MCZ is not considered further within the assessment[a].

8.6.21. The taxonomic identification of the benthic infauna across stations sampled in the survey area on 17th May 2023 yielded a total count of 14 taxa across five phyla (See Table 8-11). The intertidal benthic community was dominated by an impoverished community and species that are highly tolerant of disturbance and which have a quick recovery time[68]. This is likely due to the high suspended sediments present within the area and high organic enrichment. All stations were dominated by the oligochaete *Baltidrilus costatus* and the ragworm *Hediste diversicolor*. Station 6 was also dominated by European mud scud. All the species recorded from the samples in this area were considered commonly occurring in the region and no protected species were recorded.

[a] Impacts from the deposition of airborne contaminants has been scoped out of the assessment in agreement with the Planning Inspectorate (as shown in Table 8-2, Section ID 3.4.3 of this chapter), due to the likely dilution of any airborne contaminants caused by tidal mixing and the high flow levels in the Thames Middle Water Body.

Table 8-11: Intertidal Benthic Survey Results

Station	No. of taxa (per m^2)	No. of individuals (per m^2)	Key Characterising Species (Number per m^2 shown in brackets)
Intertidal 1	8	417	*Baltidrilus costatus* (327) *Copepoda* (1) *Corophium volutator* (9) *Hediste diversicolor* (64) *Manayunkia aestuarina* (1) *Peringia ulvae* (1) *Streblospio* (10) *Tubificoides pseudogaster* (4)
Intertidal 2	8	1,128	*Baltidrilus costatus* (552) *Copepoda* (1) *Corophium volutator* (69) *Hediste diversicolor* (299) *Manayunkia aestuarina* (50) *Streblospio* (149) *Truncatelloidea* (1) *Tubificoides pseudogaster agg.* (7)
Intertidal 3	6	1,951	*Baltidrilus costatus* (1316) *Corophium volutator* (87) *Hediste diversicolor* (502) *Manayunkia aestuarina* (10)

Station	No. of taxa (per m^2)	No. of individuals (per m^2)	Key Characterising Species (Number per m^2 shown in brackets)
			Streblospio (19) *Tubificoides heterochaetus* (17)
Intertidal 4	11	955	*Amphipoda* (1) *Baltidrilus costatus* (203) *Copepoda* (1) *Corophiidae* (13) *Corophium volutator* (112) *Cyathura carinata* (4) *Hediste diversicolor* (490) *Manayunkia aestuarina* (91) *Nereididae* (10) *Streblospio* (25) *Tubificoides heterochaetus* (5)
Intertidal 5	8	1,039	*Baltidrilus costatus* (515) *Corophium volutator* (111) *Cyathura carinata* (2) *Hediste diversicolor* (332) *Manayunkia aestuarina* (19) *Nereididae* (8) *Streblospio* (51) *Tubificoides heterochaetus* (1)

Station	No. of taxa (per m^2)	No. of individuals (per m^2)	Key Characterising Species (Number per m^2 shown in brackets)
Intertidal 6	9	925	*Baltidrilus costatus* (93) *Corophium* (14) *Corophium volutator* (472) *Cyathura carinata* (1) *Enchytraeidae* (4) *Hediste diversicolor* (326) *Manayunkia aestuarina* (5) *Scrobicularia plana* (1) *Streblospio* (9)

Subtidal Benthic Communities

8.6.22. The invertebrate species commonly found in brackish subtidal sections of the Thames Middle Water Body (within the Study Area) includes the amphipod *Gammarus zaddachi*, the oligochaete *Tubifex tubifex* and a non-native mollusc *Potamopyrgus antipodarum*[77].

8.6.23. The macrofaunal communities in this location of the Thames Middle Water Body tend to be characterised by low species diversity and abundances. For example, the communities found during subtidal surveys conducted at Borthwick and Thames Wharf's (located approximately 10.5km and 9km, respectively, upstream of the Site Boundary) were impoverished and dominated by species such as the scavenging amphipod *G. zaddachi* and brackish mud shrimp *Apocorophium lacustrae*, with oligochaete, isopods, polychaete and molluscs also recorded in low abundances. The subtidal substrate at these sites consisted of cobbles and gravels, likely a result of high scour and frequent disturbance of the bed[77].

8.6.24. The freshwater snails *Cochliopidae* Type A, *Cochliopidae* Type B and lagoon sea slug *Tenellia adspersa* were recorded 14km upstream of the Site Boundary at Enderby Wharf in 2009[77]. These species are protected under Schedule 5 of the WCA and listed as a UKBAP priority species. Lagoon sea slug is also an SPI under Section 42 of the NERC Act[15].

8.6.25. Subtidal benthic communities at Gallions Reach, approximately 4km upstream from the Site Boundary, were found to support Trembling sea mat *Victorella* sp[78].This nationally rare bryozoan is protected under Schedule 5 of the WCA and as a SPI under Section 42 of the NERC Act.[15] It is also listed in the UK BAP as a priority species. Sea mat *Einhornia crustulenta*, which is a nationally rare species[79], was also present.

8.6.26. *Victorella sp* was also detected in 2012 at an Environment Agency TraC benthic invertebrate monitoring site[38], located approximately 8km downstream of the Site Boundary.

8.6.27. The consistency in the communities found in the subtidal zone in this area of the Thames suggests the presence of a relatively uniform habitat. However, salinity significantly influences species distribution, with invertebrate composition along estuaries reflecting tolerance to variations in salinity[80,81]. Therefore, macrofaunal communities could show significant variation within the Study Area compared to habitats with less variability in salinity levels.

8.6.28. The taxonomic identification of the benthic infauna across stations sampled in the survey area on 18th May 2023 yielded a total count of 14 taxa (See Table 8-12). The 14 taxa consisted of 2230 individuals of primarily *Tubificoides pseduogaster agg*, and *Streblospio spp*. The macroinvertebrate community across the sites was generally comprised of low species richness. All the species recorded from the samples in this area were considered commonly occurring in the region and no protected species were recorded. The non-native species *Marenzellariea* was recorded at two sample stations (S10 and S12).

8.6.29. Brown shrimp *Crangon crangon*, mysis shrimp *Mysid spp* and *Gammarus spp* were observed within the beam trawl transect surveys carry out on 18th May 2023.

8.6.30. The subtidal samples primarily consisted of an impoverished community and of species that are highly tolerant of disturbance and have a quick recovery time[68].

Table 8-12: Subtidal Benthic Survey Results

Station	Sediment Type	No. of taxa (per m^2)	No. of individuals (per m^2)	Total Biomass (g, per m^2)	Key Characterising Species (Number per m^2 shown in brackets, 'P' indicates presence of taxa)
Subtidal 7	Sand	2	90	1.001	*Cyathura carinata* (20) *Peringia ulvae* (70)
Subtidal 8	Mud	3	40	0.2690	*Tubificoides pseudogaster agg.* (20) *Corophiidae* (10) *Cyathura carinata* (10)
Subtidal 9	Muddy sand	3	40	0.0080	*Steblospio* (20) *Gammarus* (20) *Araceae* (P)
Subtidal 10	Muddy sand	8	680	0.2760	*Enchytraeidae* (30) *Tubificoides pseudogaster agg.* (130) *Maranzelleria* (10) *Steblospio* (490) *Gammarus* (10) *Peringia ulvae* (10) *Einhornia crustulenta* (P) *Araceae* (P)

Station	Sediment Type	No. of taxa (per m^2)	No. of individuals (per m^2)	Total Biomass (g, per m^2)	Key Characterising Species (Number per m^2 shown in brackets, 'P' indicates presence of taxa)
Subtidal 11	Muddy sand	7	340	0.4160	*Enchytraeidae* (10) *Baltidrilus costatus* (10) *Tubificoides pseudogaster agg.* (140) *Hediste diversicolor* (10) *Steblospio* (120) *Gammarus* (40) *Corophiidae* (10)
Subtidal 12	Muddy sand	10	1,040	1.5720	*Enchytraeidae* (10) *Tubificoides pseudogaster agg.* (350) *Hediste diversicolor* (20) *Polydorini* (10) *Marenzelleria* (30) *Steblospio* (590) *Cyathura carinata* (10) *Gastropoda* (10) *Peringia ulvae* (10) *Araceae* (P)

Marine Plants and Macroalgae

8.6.31. A macroalgae survey was conducted in 2020 for the Thames Middle Water Body approximately 2km upstream from the Site Boundary[82]. Two species were detected, sea lettuce *Ulva* spp. and bladder wrack *Fucus vesiculosus*, accounting for 84% and 16% of cover, respectively. Sea lettuce is considered an opportunistic species which is often present in eutrophic areas and both species were detected growing on hard substrate.

8.6.32. The site visit undertaken on the 4th November 2022 determined the composition of marine plants and algae within the intertidal regions of the Study Area. The top section of the wall is within the splash zone and has some growth of salt-tolerant terrestrial plant species. The mid-section of the wall was colonised by filamentous green algae, with a band of seaweed, comprising fucoid species, present along the base of the wall. A small area of fringing saltmarsh comprising mainly of common reed *Phragmities australis* are located to the west of the Study Area in a small embayment, located approximately 500m west of the Proposed Scheme.

Phytoplankton

8.6.33. Environment Agency TraC phytoplankton monitoring data for the Thames Middle Water Body was available from surveys conducted in 2019 at one survey location within the Study Area[38] at NGR TQ5057580610 (the most recent TrAC data available). The assemblage was predominantly diatoms and protozoans, with no INNS detected.

Fish

8.6.34. The Thames Estuary supports diverse fish fauna, with over 115 species recorded in Environment Agency fish surveys[40]. The Thames Estuary is commonly split into the inner, middle and outer.

8.6.35. This assessment has primarily focused on protected/notable fish species. These species can be categorised by life-history and habitat preferences to include:

- Demersal (D): bottom dwelling or mid-water fish that have close associations with benthic habitats/seabed;
- Pelagic (P): free swimming fish that inhabit the mid water column, with little association with benthic habitats/seabed; and
- Migratory (M): fish that migrate, often between seawater and freshwater habitats, as a part of their life cycle.
- Elasmobranchs (E): Cartilaginous fish including sharks and rays.

8.6.36. A summary of regulations relevant to protected/notable fish species within the inner Thames Estuary, and their habitat preference, is summarised in **Table 8-13**. All notable species (including freshwater (FW)) that have been recorded within the inner Thames Estuary are included in this table, however that does not assume presence in or close to the Study Area.

8.6.37. Recent catch data from Environment Agency TraC monitoring surveys (4th November 2022) is presented in **Table 8-14**.

8.6.38. Elasmobranchs, which include sharks, rays and skates, have also been recorded in the Thames Estuary and are discussed independently in **Paragraphs 8.6.49** and **8.6.50** below.

Demersal

8.6.39. The Thames Estuary provides spawning and nursery grounds for several demersal species, including cod, whiting *Merlangus merlangus*, plaice Pleuronectes platessa and flounder *Platichthys flesus*[83]. High intensity spawning/nursery grounds tend to be situated in the outer Thames Estuary, approximately 42km downstream from the Site Boundary, however, these species have been recorded upstream of the Site Boundary.

8.6.40. Environment Agency TraC fish monitoring surveys are regularly conducted at Woolwich, approximately 5km upstream of the Site Boundary[38]. Three sites were surveyed in 2022 with ten species recorded (**Table 8-14**). This included several demersal species, such as Dover Sole *Solea solea*, whiting, flounder, sand goby *Pomatoschistus minutus* and red mullet *Mullus surmuletus.* Other species included red gurnard *Chelidonichthys cuculus*, red mullet *Mullus surmuletus* and Pouting *Trisopterus luscus*. Environment Agency TraC fish monitoring surveys have also been conducted at West Thurrock, approximately 13km downstream of the Site Boundary. Flounder, sand goby, red mullet and rock goby were recorded at the West Thurrock Environment Agency TraC site in 2018 (**Table 8-14**).

8.6.41. Dover sole, whiting and sand goby are afforded legislative protection (**Table 8-13**). Dover sole is also a commercially important species.

8.6.42. Short-snouted seahorse *Hippocampus hippocampus* has also been detected in Environment Agency TraC data for the middle Thames Estuary in 2011 and 2017[38,40]. This species is also afforded legislative protection (**Table 8-13**).

Pelagic

8.6.43. Pelagic marine species are commonly found in the Thames Estuary, often utilising the Thames Estuary for spawning and nursery grounds[83].

8.6.44. Sea bass *Dicentrarchus labrax* and herring *Clupea harengus* were recorded at the Woolwich Environment Agency TraC fish monitoring location in 2022, in low abundance[38]. Herring have also been recorded at the Wes Thurrock Environment Agency TraC fish monitoring location in 2018. The Environment Agency have stated that sprat is also regularly caught at the West Thurrock monitoring station and during low flow years, they are likely to be present within the Study Area.

8.6.45. The Thames Estuary is an important spawning ground for herring[83], which is a protected species (**Table 8-13**). However, no spawning grounds have been recorded as far inland as the Site and the salinity levels are likely at the lower limit considered suitable for herring spawning[62].

Migratory

8.6.46. Migratory fish species present in the Thames Estuary include European smelt *Osmerus eperlanus*, Atlantic salmon *Salmo salar*, brown/sea trout *Salmo trutta*, twaite shad *Alosa fallax*, lamprey sp *Petromyzontidae* and European eel *Anguilla anguilla.* All these species are protected (**Table 8-13**). Allis shad *Alosa alosa* have also been observed within the Study Area by the Environment Agency.

8.6.47. The Thames Estuary supports nationally important populations of European smelt[38,40]. This species was recorded at the Woolwich Environment Agency TraC fish monitoring location in 2022 (**Table 8-14**), with evidence that there is a spawning site located near Greenwich (approximately 10km upstream of the Site Boundary)[41].

8.6.48. European eel are recorded in high densities within the Thames Estuary, all year round, utilising the Thames Estuary as a migratory corridor. Whilst not detected in 2022, European eel has been detected at the Woolwich Environment Agency TraC fish monitoring location in previous years[38]. Additionally, freshwater fish surveys and monitoring programmes have recorded European eel in the River Roding[38,42], which joins the Thames approximately 4km upstream from the Site Boundary. This demonstrates that eels are migrating through this section of the Thames.

8.6.49. Atlantic salmon, brown/sea trout, lamprey and twaite shad are anadromous species that migrate from marine waters through the Thames Estuary to freshwater spawning sites. None of these species have been regularly detected within the vicinity of the Site[38]. However, the absence of protected/notable species in surveys does not preclude their presence, as survey methodology and timing can impact catch return. However, the Environment Agency has stated in its response to the Scoping Report[34] that European eel are abundant within the area, with juvenile glass eels migrating past the Study Area during late March and adult silver eels returning to sea from October onwards. The Environment Agency has also stated that sea trout have been captured previously within the Study Area. Therefore, a precautionary principle will be applied, with species assumed to be present.

Elasmobranchs

8.6.50. The Thames Estuary is known to be home to at least five species of elasmobranchs: Tope shark *Galeorhinus galeus*, starry smoothhound shark *Mustelus asterias*, spurdog shark *Squalus acanthias*, lesser spotted dogfish *Scyliorhinus canicula* and thornback ray *Raja clavata*[40,42].

8.6.51. These species are predominantly found in the outer Thames Estuary and are unlikely to be able to tolerate the salinity levels within the Study Area (described in **Section 8.5**). No elasmobranch species have been recorded in recent fish monitoring within the Study Area[38].

Table 8-13: Protected Fish Species Present within the Thames Estuary [38,39,42]

Common Name	Latin Name	Habitat Preference[b]	IUCN Red List[c]	WCA	NERC SPI	Bern Convention Protected Fauna	Habitat Directive	MCZ Species Features of Conservation Importance	LBAP Priority Species	UK BAP Priority Species
Atlantic cod	*Gadus morhua*	D	VU	-	✓	-	-	-	-	✓
Atlantic salmon	*Salmo salar*	M	LC	-	✓	Annex III	Annex II, V	-	✓	✓
Barbel	*Barbus barbus*	FW	LC	-	-	-	Annex V	-	-	-
Brown/sea trout	*Salmo trutta*	M	LC	-	✓	-	-	-	✓	✓
European Bullhead	*Cottus gobio*	FW	LC	-	-	-	Annex II	-	-	-
Common goby	*Pomatoschistus microps*	D	LC	-	-	Annex III	-	-	-	-
Dover sole	*Solea solea*	D	DD	-	✓	-	-	-	-	✓

[b] D = Demersal, M = Marine, F = Freshwater and P = Pelagic.
[c] VU = Vulnerable, LC = Least Concern, DD = Data Deficient, CR = Critically Endangered.

Common Name	Latin Name	Habitat Preference[b]	IUCN Red List[c]	WCA	NERC SPI	Bern Convention Protected Fauna	Habitat Directive	MCZ Species Features of Conservation Importance	LBAP Priority Species	UK BAP Priority Species
European eel	*Anguilla anguilla*	M	CR	-	✓	-	-	-	✓	✓
European plaice	*Pleuronectes platessa*	D	LC	-	✓	-	-	-	-	✓
European smelt	*Osmerus eperlanus*	M	LC	-	✓	-	-	✓	✓	✓
Atlantic herring	*Clupea harengus*	P	LC	-	✓	-	-	-	-	✓
Long-snouted seahorse	*Hippocampus guttulatus*	D	DD	Schedule 5[14]	✓	-	-	✓	-	✓
River lamprey	*Lampetra fluviatilis*	M	LC	-	✓	Annex III	Annex II, V	-	✓	✓
Sand goby	*Pomatoschistus minutus*	D	LC	-	-	Annex III	-	-	-	-
Short-snouted seahorse	*Hippocampus hippocampus*	D	DD	Schedule 5	✓	Annex II	-	✓	-	✓

Common Name	Latin Name	Habitat Preference[b]	IUCN Red List[c]	WCA	NERC SPI	Bern Convention Protected Fauna	Habitat Directive	MCZ Species Features of Conservation Importance	LBAP Priority Species	UK BAP Priority Species
Twaite shad	*Alosa fallax*	M	LC	Schedule 5[14]	✓	Annex II, V[19]	-	-	✓	✓
Whiting	*Merlangius merlangus*	D	LC	-	✓	-	-	-	-	✓

Table 8-14: Environment Agency TraC Fish Survey Data from Woolwich 4-11-2022 and West Thurrock 2018[38]

Common Name	Latin Name	Site 1 (TQ 44683 80971)[d]	Site 2 (TQ 44679 80921)[e]	Site 3 (TQ 45430 81420)[f]	West Thurrock (TQ 6077477518)
		(Number of individuals caught)			
Red Gurnard	*Aspitrigla cuculus*	1	1	-	-
Red mullet	*Mullus surmuletus*	2	-	-	1
Pouting	*Trisopterus luscus*	1	1	1	-
European smelt	*Osmerus eperlanus*	5	7	6	-
Dover sole	*Solea solea*	67	27	16	-
Sand goby	*Pomatoschistus minutus*	9	5	9	88
Whiting	*Merlangius merlangus*	95	19	44	-
Flounder	*Platichthys flesus*	99	23	7	5
Atlantic sea bass	*Dicentrarchus labrax*	1	1	3	80
Herring	*Clupea harengus*	-	-	10	1
Sand smelt	*Atherina presbyter*	-	-	-	1

[d] Site 1 (TQ 44683 80971) is located approximately 4.75km upstream of the Site Boundary.
[e] Site 2 (TQ 44679 80921) is located approximately 4.75km upstream of the Site Boundary.
[f] Site 3 (TQ 45430 81420) is approximately 4km upstream of the Site Boundary.

Common Name	Latin Name	Site 1 (TQ 44683 80971)[d]	Site 2 (TQ 44679 80921)[e]	Site 3 (TQ 45430 81420)[f]	West Thurrock (TQ 6077477518)
		(Number of individuals caught)			
Thick lipped grey mullet	*Chelon labrosus*	-	-	-	4
Rock goby	*Gobius paganellus*	-	-	-	2
Common goby	*Pomatoschistus microps*	-	-	-	28

Baseline Fish Surveys

8.6.52. Two subtidal beam trawl transects were undertaken on 18th May 2023 in order to determine the fish community present within the Study Area. Five species were recorded within transect one; European smelt *Osmerus eperlanus*, sea bass *Dicentrarchus labrax*, dover sole *Solea solea*, flounder *Platichthys flesus* and transparent goby *Aphia minuta*. The second trawl recorded three species of fish; sea bass, flounder and the body of a European eel *Anguilla anguilla* which was decaying. European eel and European smelt are protected species (**Table 8-13**). Results from this survey are presented in **Table 8-15**.

Table 8-15: Results from the Beam Trawl on 18th May 2023

Common Name	Latin Name	Trawl No.1	Trawl No.2
European smelt	*Osmerus eperlanus*	1	-
Sea bass	*Dicentrarchus labrax*	3	2
Dover sole	*Solea solea*	29	-
Transparent goby	*Aphia minuta*	1	-
Flounder	*Platichthys flesus*	2	1
European eel (decaying)	*Anguilla anguilla*	-	1

Marine Mammals

Pinnipeds

8.6.53. There are two resident pinniped species within the Thames Estuary, the grey seal *Halchoerus grypus* and harbour seal *Phoca vitulina*, with populations of approximately 3,200 and approximately 900 respectively recorded within the Thames Estuary as a whole[84]. There are records of both species in the vicinity of the Site, however, most have been recorded within the Outer Estuary (foraging).

8.6.54. The nearest haul out sites for harbour seal is Gravesend, and Maplin Sands for grey seals. These are located approximately 19km and 60km downstream from the Site Boundary, respectively. However, both species are commonly observed foraging in the Bexley and Greenwich area of the Thames and have been reported as far inland as Teddington[85,86]. Grey and harbour seals have historically been recorded, within and upstream of the Site by ZSL surveys since 2004[85]. The most recent sightings in 2023, recorded these species within 10km of the Site Boundary (three grey seals, two harbour seals), the closest being 1.3km upstream[85].

8.6.55. Both species are protected under the Conservation of Seals Act 1970[23], the WC[14] and are listed in Annex II of the EC Habitats Directive[16]. Harbour seal is also a UK BAP Priority Marine Species. The grey seal is also listed as an Appendix III species under the Bern Convention.

Harbour Porpoise

8.6.56. There is a significant year-round presence of harbour porpoises (*Phocoena phocoena*) in the Thames Estuary, with peaks in spring (March-April) and late summer (July-August)[87].

8.6.57. This species is observed in high densities in the outer Thames Estuary; however, individuals have been observed in the vicinity of the Site, being reported as far inland as Richmond[86].

8.6.58. The species is protected under The Marine and Coastal Access Act 2009[25] and the WCA[14]. It is also listed under CITES Appendix II and Annex II of the EC Habitats Directive[16], and classified as a Priority Marine Species in the UK BAP. The UK also has obligations for harbour porpoise conservation as a contracting party to the OSPAR Convention[24] and the Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS).

Invasive Non-Native Species

8.6.59. INNS are widespread throughout the Thames Estuary, with many species becoming well established. Marine INNS present within the Thames Estuary include[88]:

- Zebra mussel *Dreissena polymorpha*;
- Quagga mussel *Dreissena rostriformis bugensis*;
- Chinese mitten crab *Eriocheir sinensis*;
- Asiatic clam *Corbicula fluminea*;
- Slipper limpet *Crepidula fornicata*;
- Carpet sea squirt *Didemnum vexillum*;
- Pacific oyster *Magallana gigas*;
- Polychaete *Boccardiella ligerica*;
- New Zealand mudsnail *Potamopyrgus antipodarum*; and
- Bay barnacle *Amphibalanus impovisus*.

8.6.60. Many of these species have been detected at Environment Agency TraC monitoring sites both upstream and downstream of the Study Area and are likely to be present within the Study Area.

8.6.61. The species provided here reflect marine and aquatic macroinvertebrate INNS present within the Thames Estuary. However, it must be noted that there are likely further INNS present within the Thames that are not listed within this section.

FUTURE BASELINE

Overview

8.6.62. Climate change is the single most prevalent factor when considering the future baseline of an ecosystem or species community[89]. Climate change affects ecology via multiple pathways. Impacts on species are considered to include changes in distribution and abundance, the timing of seasonal events and habitat use and, as a consequence, there are likely to be changes in the composition of plant and animal communities. Habitats and ecosystems are also likely to change in character.

8.6.63. With regards to the key marine biodiversity features known to be present within the Site and Study Area (as described in the section above), it is difficult to predict with considerable confidence their likely response to climate change. However, the following section presents known information on the medium and long term trends in distribution and abundance for such features.

8.6.64. The future baseline assumes that existing commercial business within the Site, that utilise the Thames would remain at their current locations should the Proposed Scheme not proceed. These include Riverside 1, including the Middleton Jetty. Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken) would also be operational in the future baseline, generating additional vessel traffic. Further information on vessel traffic is provided in **Chapter 19: Marine Navigation (Volume 1)**. There is also potential for other developments to affect receptors outside of the Site Boundary, where dredging is involved and there is spatial and temporal overlap during construction and operation. This will be assessed in **Chapter 21: Cumulative Effects (Volume 1)**.

Nationally Designated sites

8.6.65. Rising sea levels and increasing water temperatures may result in a regime shift due to northward range expansion of ‘southern species’ and a retreat of ‘northern species’. Increased water temperatures may also result in increased habitat viability for INNS, which may cause the degradation or loss of native benthic species. Rising sea levels may also result in an increase in the habitat available for subtidal species and a reduction for intertidal adapted species.

8.6.66. Rising sea level can also result in coastal squeeze, when man-made structures or human activities prevent natural habitats migrating landward in response rising sea levels. This may cause the loss of intertidal habitats, such as saltmarsh and intertidal mudflat, which will have impact on intertidal species due to reduced or loss of habitat.

Non-statutory designated sites

8.6.67. Non-statutory sites are subject to the same pressures as nationally designated sites and will be subject to the impacts described in **Paragraphs 8.6.65** and **8.6.66**.

Thames Middle Habitats and Species

8.6.68. Coastal squeeze occurs when man-made structures or human activities prevent natural habitats migrating landward in response to rising sea levels. This may cause the loss of intertidal habitats, such as saltmarsh and intertidal mudflat, which will have impact on intertidal species due to reduced or loss of habitat.

Benthic Communities (subtidal and intertidal)

8.6.69. Rising sea levels and increasing water temperatures may result in a regime shift due to northward range expansion of 'southern species' and a retreat of 'northern species'. Increased water temperatures may also result in increased habitat viability for INNS, which may cause the degradation or loss of native benthic species. Rising sea levels may also result in an increase in the habitat available for subtidal species and a reduction for intertidal adapted species.

Marine Plants and Macroalgae

8.6.70. Rising sea level and coastal squeeze have the potential to result in reduced habitat viability for saltmarsh species due to increased immersion times and increased water depths. Sea level rise may also allow increase the amount of habitat available for intertidal algal species and may result in increased colonisation of the river wall.

Fish

8.6.71. Rising sea levels and increasing water temperatures may result in a regime shift due to northward range expansion of 'southern species' and a retreat of 'northern species'. Alterations to habitat types, including coastal squeeze may also result in changes in fish community composition.

Marine Mammals

8.6.72. Changes to the benthic communities and fish caused by rising sea level and increased water temperatures may have indirect impacts upon marine mammals through changes in prey availability. This could result in this section of Thames Estuary no longer providing viable habitat for these species.

Invasive Non-Native Species

8.6.73. The effects of climate change, including rising sea levels and increasing water temperatures, may facilitate the spread and establishment of INNS through increased habitat viability and reduced competition/predation.

8.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

8.7.1. This section sets out the embedded avoidance, mitigation and compensation measures which are relevant to marine biodiversity.

CONSTRUCTION PHASE

8.7.2. Relevant design, mitigation and enhancement measures will be identified in the ES, and these will include:

- A minimised construction footprint to reduce/avoid potential habitat loss. This includes the Proposed Jetty and capital dredge footprint.
- Adherence to relevant Environmental Permits, best practice guidance and regulations, British Standards, and monitoring for the protection of marine biodiversity features and to ensure water quality impacts are minimised.
- Works below the mean high-water springs (MHWS), such as construction of the Proposed Jetty and dredging activities, will be subject to a Deemed Marine Licence. Measures will be developed for this alongside engagement with the MMO.
- Robust measures and equipment for dealing with any unexpected pollution events will be in place at all times.
- All construction materials used will be safe for use in the marine environment.
- An Outline Lighting Strategy will be developed to reduce impacts upon the marine environment. The Outline Lighting Strategy will include elements such as: where practicable, lighting should be positioned carefully, and measures implemented to minimise light spillage into the marine environment. This includes using lights with high directionality and employing controls to reduce light levels when not required (unless for safety and navigation); and to determine suitable light intensity (minimum requirements for a given task and selection of those with low intensity) and tailorable spectrum. Screening may also be required in the intertidal areas.
- Implementation of a CoCP (an OCoCP will be submitted as part of the application for development consent).
- Any construction activity that may cause direct disturbance to the marine environment (such as piling) should not commence unless an ECoW is present. This is to ensure sensitive species, notably marine mammals, are absent from the area.
- Construction activities such as piling, and capital dredging should occur outside of sensitive periods for sensitive fish species identified within this chapter. This includes migration, spawning and nursery periods and should be clearly stated in the OCoCP. The most appropriate timing will be agreed with the regulatory bodies.
- Where practicable, low noise piling techniques (pile press in technology) or vibro piling will be used to minimise the impact on fish and marine mammals. If this is not feasible, the ES will set out justification for any use of percussive piling methods.

- Construction vessel speeds will be moderated by following standard operating procedures. Where practicable, there will be an implementation of reduced vessel speeds in proximity of piers to reduce potential for vessel strike with marine mammals and fish and to reduce the risk of any potential damage to intertidal habitats from wave wash.
- It is expected that construction vessels will follow standard procedures for managing INNS in their ballast water. As part of the CoCP (to be developed based on the OCoCP) a Biosecurity Management Plan will be developed and implemented with standard biosecurity measures, in line with best practice UK guidance and will be discussed in liaison with the Environment Agency, Natural England, the PLA and the MMO, as appropriate. This will promote the effective cleaning of all marine equipment and infrastructure (if, utilised in other waterbodies), along with preventing the release of any subsequent waste arisings back into the marine environment. Relevant guidance such as the Check, Clean, Dry campaign led by the GB Non-native Species Secretariat will also be followed. Provision of local materials will be used where practicable, and materials should be appropriately treated to minimise the potential spread of INNS.
- Accidental fuel leaks from construction vessels will be managed through the OCoCP.
- All construction vessels will act in accordance with their own management/accident plans, as well as those of the Port of London Authority/Maritime Coastal Agency, thus limiting the potential for accidental fuel leaks.
- Demolition of the existing Belvedere Power station Jetty (disused) (if required) and excavation activities in the intertidal zone, involving potential excavation work should, where practicable, occur during low tide conditions to minimise the dispersion of suspended sediment.

OPERATION PHASE

8.7.3. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include, but are not limited to:

- The Proposed Scheme requires the operation of a waste water treatment plant for water generated during operation see **Chapter 2: Site and Proposed Scheme Description (Volume 1).** Two options for disposal of waste water have been considered: disposal into a foul water sewer; and discharge into the River Thames via an outfall on the Proposed Jetty. Should discharge into the River Thames be progressed (worst-case), the outfall will be designed to have a perched discharge from the Proposed Jetty, to avoid biofouling and subsequent use of chemicals for cleaning in the marine environment. A perched design will also prevent fish and particularly European eel from entering the system and becoming trapped.
- An Outline Lighting Strategy will be developed and included within the application for development consent. This will include measures tor to reduce impacts to marine receptors see **Chapter 2: Site and Proposed Scheme Description (Volume 1).**

- Operational vessel speeds will be moderated by following standard operating procedures. Where practicable, there should be reduced vessel speeds in proximity of piers to reduce potential for vessel strike with marine mammals and fish and to reduce the risk of any potential damage to intertidal habitats from wave wash.
- All operational vessels will act in accordance with their own management/accident plans, as well as those of the Port of London Authority/Maritime Coastal Agency, thus limiting the potential for accidental fuel leaks.
- It is expected that vessels will follow standard procedures for managing INNS in their ballast water. A Biosecurity Management Plan will be developed as part of the CoCP and implemented with standard biosecurity measures, in line with best practice UK guidance. This will promote the effective cleaning of all marine equipment and infrastructure (if, utilised in other waterbodies), along with preventing the release of any subsequent waste arisings back into the marine environment. Relevant guidance such as the Check, Clean, Dry campaign led by the GB Non-native Species Secretariat will also be followed. The supply route of vessels, equipment and infrastructure in the Study Area will be determined as part of subsequent work in the ES.
- Maintenance dredging should occur outside of sensitive periods for sensitive fish species. This includes migration, spawning and nursery periods and will be clearly stated in the OCoCP.

8.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

8.8.1. This section details the preliminary assessment of the impacts and effects of the Proposed Scheme during both the construction and operation phases, taking account of the embedded design, mitigation and enhancement measures detailed in **Section 8.7** and prior to the mitigation measures set out in **Section 8.9**.

8.8.2. It should be noted that this assessment is preliminary and will be updated within the ES as a result of ongoing design development for the Proposed Scheme.

8.8.3. The demolition or retention of the Belvedere Power Station Jetty (disused) is discussed within the assessment presented in this chapter, however alongside ongoing design development, this will be assessed further and impacts and effects reported will be confirmed in the ES.

8.8.4. There are two potential arrangements for the Proposed Jetty, as described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** and **Chapter 3: Consideration of Alternatives (Volume 1)**. The following assessment will take a precautionary approach and assess the worst-case scenario for each sensitive receptor. Therefore, during the assessment, different receptors will be assessed against different options (i.e., subtidal benthic communities will be assessed against Option 2, whereas intertidal benthic communities will be assessed against Option 3).

CONSTRUCTION PHASE

8.8.5. The potential likely significant effects for marine biodiversity associated with the construction phase of the Proposed Scheme are set out below.

8.8.6. The construction assessment presented in this chapter is appropriate for both construction programme options, as set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, although this will be assessed and confirmed in the ES.

Loss or Disturbance of Habitat

8.8.7. The changes in loss or disturbance of habitat that could potentially occur as a result of construction work include:

- loss or disturbance to subtidal habitat from the construction of the Proposed Jetty due to dredging and piling (Option 2 and Option 3);
- loss or disturbance to intertidal habitat from the construction of the Proposed Jetty (Option 3) and piles (Option 2 and Option 3); and
- potential increase in available intertidal habitat overall due to the demolition of the Belvedere Power Station Jetty (disused) if this option is pursued once demolition activities have concluded.
- potential loss in available intertidal habitat from the construction of the Proposed Jetty and the Belvedere Power Station Jetty is retained.

8.8.8. The habitats that will be directly disturbed by dredging and piling activities, for installation of the Proposed Jetty Option 2 will be located in the subtidal environment, therefore minimising loss of intertidal habitat (through construction of jetty support legs). If Option 3 is selected, it will result in the largest loss of intertidal habitat due to the presence of the pier head within the intertidal zone. As explained in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, the preferred position for the location of the Proposed Jetty is Option 2, within the subtidal environment. Based on the worst-case scenario, which is Option 3, approximately 180,000m^3 of subtidal sediment will be removed (over an area of approximately 82,675.39m^{2,} equating to 0.18% of the Thames Middle Transitional WFD water body). This is a relatively small area in relation to the Thames Middle water body in its entirety and the wider River Thames, with large areas remaining unaffected for marine ecological receptors to utilise, including potential nursery areas for fish.

8.8.9. The technique used for dredging is yet to be confirmed; the options being considered are outlined in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**. As outlined in **Section 8.3**, the duration of dredging will depend on various factors, but it will last between three to ten weeks and is therefore considered as a short term construction activity. Furthermore, as set out in **Section 8.7**, the timing of the dredging will take place outside of critical key times for sensitive species recognising the various fish species present and associated sensitive periods. This will be discussed and agreed with the Environment Agency, Natural England and PLA.

8.8.10. The precise nature of the potential demolition activities for the Belvedere Power Station Jetty (disused) is still to be determined. The options are either retention or full demolition. If the Jetty is retained, there will be no changes to intertidal habitat. If the jetty is demolished, this will increase the availability of intertidal mudflat habitat, that was previously lost, due to the presence of the piers, as well as shading impacts from the structure, this will result in a gain in intertidal mudflat habitat. The removal of the Belvedere Power Station Jetty (disused), will not result in a large loss of benthic communities on the existing pier piles, due to the impoverished nature of the communities in this section of the River Thames. The Belvedere Power Station Jetty (disused) covers an area of approximately 2331m^2, which equates to approximately 0.02% of the intertidal mudflat area within the Thames Middle water body.

8.8.11. Mitigation and enhancement measures to be employed for the Proposed Scheme are described in **Section 8.7** of this chapter. Consequently, considering many of the factors described previously (i.e., minimising footprint of development), a negligible to low magnitude is anticipated for habitat loss and disturbance. The potential effects are summarised in the following paragraphs:

8.8.12. The Medway Estuary MCZ Zone 1 & 2 sites is of National importance. This MCZ is located approximately 25km downstream and south east of the Site Boundary, thus there will be no direct effect on habitats and most features within the MCZ, due to the distance of the MCZ from the Site Boundary. However, there is potential for an indirect effect on the MCZ, via impacts to one of its qualifying features (European Smelt) which may lose some potential foraging habitat within the Site due to loss of intertidal and subtidal habitats. Due to the reasons set out above (see **Paragraphs 8.8.8** to **8.8.11**) and proposed mitigation, a precautionary low magnitude is anticipated. Therefore, there is likely to be an indirect, permanent, long term and **moderate, adverse** effect on the MCZ (**significant**).

8.8.13. The River Thames and its Tidal Tributaries SINC is of Regional/County importance, designated for various habitats (mudflats, saltmarsh and the river channel) and fish species. There will be direct loss of subtidal habitat, albeit over a relatively small area (both options); a direct loss of intertidal habitat with both Options for the jetty arrangement resulting in minimal loss and disturbance of intertidal habitat, as well as potentially increase in available intertidal habitat from the potential demolition of the Belvedere Power Station Jetty (disused). If the Belvedere Power Station Jetty is retained, this will result in the potential loss of intertidal habitat. This may subsequently result in indirect effects on nursery area habitat that support fish species in the subtidal habitat. A low magnitude is anticipated. Therefore, there is likely to be direct and indirect, permanent, long term and **moderate, adverse** effects on the SINC (**significant**).

8.8.14. The intertidal mudflat and saltmarsh habitats, and associated benthic communities, are considered to be of Regional/County importance. As set out above (see **Paragraphs 8.8.6** to **8.8.9**) there will be a small loss of mudflat if Option 2 is progressed, however there will be no direct loss of intertidal mudflat habitat from dredging activities. The saltmarsh community is located approximately 500m away from the Proposed Jetty and Belvedere Power Station Jetty (disused), in a potentially sheltered embayment, therefore effects will be minimised from dredging and the potential demolition or retention of the Belvedere Power Station Jetty (disused). There is potential for direct impacts on the intertidal mudflat from construction of the piles and pier head (resulting in a permanent loss), as well as demolition activities, however, there is also potential for beneficial effects with an increase in the availability of intertidal mudflat, that was previously lost due to the presence of the Belvedere Power Station Jetty (disused) if demolished. The intertidal benthic community is also impoverished, with high recoverability and therefore able to rapidly recolonise any areas lost or disturbed. Considering, the relatively small area that will be affected and other factors as discussed above, a low magnitude is anticipated on these habitats from dredging and demolition activities. Therefore, there is likely to be a direct, temporary, short-term and **moderate, adverse** effect on intertidal habitats (**significant**). Considering the relatively small area that will be affected and other factors as discussed above, a low magnitude is anticipated on these habitats from the construction of the new jetty and pier head. Therefore, there is likely to be a direct, permanent, long term and **moderate, adverse** effect on intertidal habitats (**significant**).

8.8.15. Subtidal habitat and its associated benthic communities are considered to be of Local importance, which is based upon the impoverished nature of the benthic community present, with an absence of any species of conservation importance and high recovery rate of communities. The area affected is also relatively small in comparison to the wider subtidal habitat present in the Thames Middle water body and wider River Thames. The magnitude is considered to be low. Therefore, there is likely to be a direct, permanent, long term, **negligible,** effect on subtidal benthic communities (**not significant**).

8.8.16. Marine plants and macroalgae (excluding saltmarsh) within the Study Area are regarded as of Local importance based on the low conservation value of those present within the intertidal area. There may be some direct impacts on these receptors within the intertidal area during construction and demolition activities, and the magnitude of impact is considered to be low. Therefore, there is likely to be indirect, permanent, long term and **negligible,** effect on marine plants and macroalgae (**not significant**).

8.8.17. The value of fish range from Regional/County to National importance. The Regional/County sensitivity is due to the presence of species of primarily low conservation value, but high commercial value within the Study Area of the Proposed Scheme, which include sea bass, dover sole and flounder. The critically endangered European eel and European smelt are considered to be of National importance within the Study Area of the Proposed Scheme, as these are a Species of Principal Importance. The European smelt also forms part of the Medway Estuary MCZ and the European eel is critically endangered.

8.8.18. The potential effects on fish and the value of this surrounding area as supporting habitat (nursery) were described previously in **Paragraph 8.8.14** and some younger year classes were recorded during the May 2023 surveys. However, the area affected is relatively small in comparison to the intertidal and subtidal habitat available in the Middle Thames water body and wider River Thames, the final Proposed Scheme design will also determine the scale of impact upon fish species. The magnitude is currently considered to be a precautionary low. Consequently, there is likely to be an indirect, permanent, long term**, moderate, adverse** effect on fish species of commercial value (**significant**). For those of National importance, there is likely to be an indirect, permanent, long term, **moderate, adverse** effect on the European eel, European smelt and other species (**significant**). A full assessment of all Nationally important species will be provided in the ES, to determine what the exact impacts are anticipated to be (e.g., changes to population size). This will be dependent on the final design of the Proposed Development.

8.8.19. Marine mammals (grey seals, harbour seals and harbour porpoises) are considered to be of National importance. Due to the highly mobile nature of marine mammals, their ability to readily utilise other areas of the River Thames and this small loss /disturbance of habitat and therefore foraging area in comparison to the subtidal habitat available within the Middle Thames water body and wider River Thames, the magnitude is anticipated to be negligible. Therefore, there is likely to be an indirect, permanent, long term, **negligible,** effect on marine mammals (**not significant**).

Changes in Water Quality and Release of Contaminants

8.8.20. The changes in water and sediment quality that could potentially occur as a result of construction works are presented in **Chapter 11: Water and Flood Risk (Volume 1).** These include but are not limited to changes to water and sediment quality as a result of:

- increased levels of suspended solids, mobilisation of sediment-bound contaminants and their subsequent deposition, due to dredging, piling and demolition operations; and
- accidental release of contaminants, due to potential fuel leaks from vessels.

8.8.21. The suitability of the dredged material to be used on site, disposed on land or offshore at a licenced disposal site will be assessed in **Chapter 16: Materials and Waste (Volume 1)** of the ES and if necessary if they are to be disposed offshore, then considered in the Marine Biodiversity chapter of the ES. This will include consideration of the waste hierarchy, analysis of the borehole data from actual dredged area and discussions with the MMO and CEFAS.

8.8.22. Change in water and sediment quality due to accidental fuel leaks will be assessed as part of the ES. Furthermore, all operation phase vessels will act in accordance the EPRP that the DCO will require to be produced. An OEPRP will be prepared and submitted alongside the application for development consent, as well as those of the Port of London Authority/Maritime Coastal Agency, thus limiting the potential for accidental fuel leaks. The potential risk will also be managed through the OCoCP. Consequently, a precautionary medium magnitude of impact is currently derived, which will be confirmed as part of the ES.

8.8.23. As further detailed information is required, no further assessment is provided in this PEIR chapter. However, an assessment will be undertaken on the following marine ecological receptors in the ES:

- Medway and Estuaries MCZ, Zone 1 & 2;
- River Thames and its Tidal Tributaries SINC;
- Intertidal and subtidal habitats;
- Marine plants and macroalgae;
- Phytoplankton and zooplankton;
- Fish; and
- Marine mammals.

Noise and Vibration

8.8.24. The noise and vibration effects that could occur as a result of construction works are presented in **Chapter 6: Noise and Vibration (Volume 1)**. These include noise and vibration generated from:

- piling activities;
- dredging for construction; and
- the potential demolition of the Belvedere Power Station Jetty (disused). If the Belvedere Power Station Jetty is retained, there will be no noise or vibration impacts in relation to this jetty.

8.8.25. Noise levels and their effects on fish and marine mammals will be determined as the design progresses. An underwater noise study will be undertaken to support the marine biodiversity assessment that will be subsequently assessed in the ES chapter. This will be undertaken for fish of Regional/County to National importance (including hearing specialist species (e.g., herring)); and marine mammals of National importance (i.e., common seal, grey seal and harbour porpoise).

8.8.26. Potential effects in marine ecological receptors, depending on the magnitude of the impact, can range from behavioural changes, injury, hearing loss, stress, difficulty in feeding, changes in predator/prey relations, mating disruption, stranding and mortality.

8.8.27. Potential mitigation options to consider will include the following standard guidance:

- The use of soft start for piling to allow sufficient time for sensitive marine receptors to move away.
- Employing a marine mammal observer to ensure the area is clear of marine mammals prior to the commencement of percussive piling activities and to cease piling activities if a marine mammal moves into the works area.
- Undertaking percussive piling and potentially other noisy activities outside of the key sensitive period for fish (e.g., migratory period). This will be discussed and agreed with the Environment Agency, Natural England and the PLA prior to the commencement of any construction works.

8.8.28. The magnitude and subsequent effects of noise from capital dredging are considered to be lower in comparison to some other construction related noise activities. However, this will be also assessed further in the ES to confirm this preliminary conclusion. The additional vessel traffic (including idling at jetty) and associated shipping noise is continuous and of low frequency in the Thames and is therefore unlikely to add to the existing noise experienced by fish and marine mammals.

8.8.29. An assessment will be undertaken in the ES and will be informed by underwater noise modelling and account for the above mitigation measures. The level of impact will be determined based on an assessment of the output from the underwater noise modelling on auditory thresholds of the following marine ecological receptors:

- Medway and Estuaries MCZ, Zone 1 & 2 (European smelt);
- River Thames and Its Tidal Tributaries SINC (fish);
- Fish (all Regional and National species); and
- Marine mammals.

Lighting

8.8.30. The changes in lighting that could occur as a result of construction works include:

- lighting used for construction of the Proposed Jetty; and
- lighting used during decommissioning of the Belvedere Power Station Jetty (disused) if undertaken (no impacts in addition to the current lighting baseline are anticipated if this jetty is retained).

8.8.31. Details of construction are provided in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**. Potential mitigation will be developed as the design of the Proposed Scheme progresses and discussed further in the ES chapter. Measures to minimise lighting impacts to designated areas, habitats and species and a similar approach could be undertaken for the Proposed Scheme for marine ecological receptors. Previous identified mitigation for Riverside 2 included, where practicable, construction lighting facing away from sensitive receptors. Additional proposed generic mitigation will include the development of an Outline Lighting Strategy that will:

- only installing lighting where absolutely necessary;
- careful siting of lighting locations on infrastructure; and
- incorporating measures to minimise light spillage into the marine environment, thereby using lights with high directionality and employing controls to reduce light levels, when not required (unless for safety and navigation).

8.8.32. The feasibility and value of including some enhancement at the base of the Proposed Jetty and the wooden structures of the Belvedere Power Station Jetty (disused) (if retained or not fully demolished) to provide additional shelter for fish during daylight hours (to avoid generic predation) will also be assessed, considering the turbid nature of the Study Area within the River Thames.

8.8.33. The potential range of effects from artificial lighting on marine ecological receptors varies but can lead to changes in behaviour: photopositive (attracted to light) to photonegative (repelled by light) responses; disorientation; changes in normal diel vertical migration for feeding and avoiding predation (e.g., in zooplankton and fish); subsequent indirect alterations in food chain predator/prey relations; disturbance of migratory patterns; and varying effects among different life stages.

8.8.34. For some works, it may be difficult to avoid some lighting on the marine environment, especially if the Belvedere Power Station Jetty (disused) is demolished which would require works to be undertaken within the intertidal zone. However, other mitigation could include the use of screening. In the current baseline conditions, there is already a considerable amount of light affecting the River Thames from vessels and infrastructure which therefore also affects marine ecological receptors along the River Thames. With the implementation of mitigation and consideration that only a small portion of the River Thames will be affected, along with the likely turbid nature of the Thames in this locality, the effect is anticipated to be localised and negligible. The assessment of light on marine ecological receptors is provided in the following paragraphs.

8.8.35. Due to the anticipated localised effect of lighting and the location of Medway and Estuaries MCZ Zone 1 & 2 (National importance), approximately 26km downstream of the Site Boundary, there will be no direct adverse effects of lighting on the many of the features of importance within the MCZ. However, for European smelt, which utilise the wider River Thames, there is potential for an indirect effect on this MCZ. With the implementation of the proposed mitigation and consideration of the current baseline and likely turbid waters, the magnitude of impact is considered to be negligible. Therefore, there is likely to be an indirect, temporary, medium term, and **negligible,** effect on the MCZ (**not significant**).

8.8.36. For the River Thames and Its Tidal Tributaries SINC (Regional/County importance), the magnitude of lighting is considered to be negligible for the reasons set out above in **Paragraphs 8.8.30** to **8.8.33**. Thus, there is likely to be direct and indirect, temporary, medium term and **negligible,** effect on the SINC (**not significant**).

8.8.37. For marine habitats, including saltmarsh and intertidal mudflats of Regional importance, as well as subtidal mudflats of Local importance, the magnitude of impact is considered to be negligible. Furthermore, as the saltmarsh is located approximately 500m away from the Proposed Scheme, this habitat is outside of the Study Area for works associated with the Proposed Jetty. Therefore, there is likely to be a direct, temporary, medium term and **negligible,** effect on intertidal habitats (**not significant**).

8.8.38. Marine plants and macroalgae (excluding saltmarsh) are considered to be of Local importance. The effects of lighting can increase photosynthetic rates, however, with the implementation of proposed mitigation and given that the effects will only be localised, a negligible magnitude is anticipated. Therefore, there is likely to be a direct, temporary, medium term and **negligible,** effect on these receptors (**not significant**).

8.8.39. Phytoplankton and zooplankton are considered to be of Local importance. They are known to be photopositive (attracted to light) and this can alter zooplankton's normal diel vertical migration of staying at depths during the day to surface migration at night to avoid predation. Consequently, lighting may result in subsequent increased predation by fish. However, due to the proposed mitigation, potential localised effects and turbid waters, a negligible magnitude is anticipated. Therefore, there is likely to be a direct, temporary, medium term, and **negligible,** effect on these receptors (**not significant**).

8.8.40. Fish range from being of Regional/County (medium) to National importance as set out in **Paragraph 8.8.16**. The importance of the surrounding area for supporting fish and as a potential nursery area was also previously described in **Section 8.6**. There is potential for fish to move towards illuminated areas, due to increased prey availability and to subsequently experience increased predation themselves from marine mammals and birds. Considering, however, the existing background illumination levels within the Thames, proposed mitigation, current baseline and likely localised impact, a magnitude of negligible is anticipated. Therefore, there is likely to be direct and indirect, medium term and **negligible,** effect on fish (**not significant).**

8.8.41. For marine mammals of National importance, there is potential for localised changes in zooplankton near to the surface to attract fish and subsequently lead to increased predation by marine mammals. However, due to the proposed mitigation, current baseline and likely localised impacts, the magnitude of impact is anticipated to be negligible. Therefore, there is likely to be an indirect, temporary, medium term and **negligible,** effect on marine mammals (**not significant**).

Vessel Strikes

8.8.42. During construction, there will be an increase in vessel numbers within the Study Area from:

- dredging activities;
- construction of the Proposed Jetty; and
- potential demolition of the Belvedere Power Station Jetty (disused) (this would not occur if this jetty is retained).

8.8.43. As detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, there may be several vessel movements to and from the Proposed Jetty per day during the construction phase. The number of vessel movements will depend on the construction activities being undertaken at that point in time. The preliminary Navigation Hazard Analysis (pNHA) (see **Appendix 19-1 Preliminary Navigation Hazard Analysis (Volume 3)**) states vessel traffic is lower in the Study Area in comparison to the rest of the tidal Thames. Vessels that currently pass the area consist primarily of tugs, barges and commercial shipping. The speed of vessels previously passing through the Study Area has ranged from 3-13 knots. Consequently, the number of extra construction vessels in the Study Area is unlikely to be greater than that experienced elsewhere in the wider Thames and it is likely that, when being used for construction activities, the vessels will be operating at a slower speed of almost standstill to 3 knots, this will be managed through the OCoCP.

8.8.44. These slow speeds enable sufficient time for marine mammals to move away from the disturbance, enhanced by their highly manoeuvrable abilities. Furthermore, as large areas remain unaffected by construction activities, there is sufficient space for marine mammals to pass by or reside in. A magnitude of negligible is therefore derived for this activity.

8.8.45. Marine mammals (grey seals, harbour seals and harbour porpoises) are of National Importance. The magnitude of impact is negligible due to the short term nature of construction and low number of vessel movements as described in **Paragraph 8.8.41 to 8.8.42.** Therefore, there is likely to be a direct, temporary, short term and **negligible,** effect on marine mammals (**not significant**).

Changes in Suspended Sediment Levels and Subsequent Sediment Deposition on the Benthic Environment

8.8.46. As detailed in the **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, the chosen dredging technique is still to be confirmed and this will strongly influence the level of change in suspended solids and subsequent sediment deposition within the Study Area. However, it is known that the baseline for the Study Area is highly turbid with a fair amount of sediment deposition, hence it is referred to as the 'mud reaches'. Sediment modelling for suspended sediment levels and subsequent deposition as a result of dredging will be undertaken and this will be used to support the assessment in the ES as well as determining the most appropriate mitigation measures in order to minimise impacts to marine ecology.

Increased Wave Wash

Habitats (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC) and subtidal and intertidal benthic communities)

8.8.47. Wave wash was identified as cause for concern in the Scoping Report[34] resulting in likely significant effects in relation to loss/displacement of marine intertidal habitats. As described previously, the findings of a pNHA recorded lower vessel traffic in the Study Area compared to the rest of the tidal Thames (see **Paragraph 8.8.42**). Vessels that currently pass the area consist primarily of tugs, barges and commercial shipping. The speed of vessels previously passing through the Study Area has ranged from 3-13 knots. Vessels used during construction will be travelling at a slower speed than the vessels that already pass the area with some almost stationary to potentially 3 knots. Even though there will be an increase in the number of vessels moving within the Study Area during the construction period, there is unlikely to be a change in the magnitude of wave wash created by the vessels used in construction due to the slower operating speeds of the vessels. Consequently, a negligible magnitude of impacts is derived for wave wash.

8.8.48. The Medway Estuaries MCZ Zone 1 & 2 is of National importance. European smelt may rely on habitats within the Study Area. Due to the reasons set out in **Paragraph 8.8.11**, a negligible magnitude of impact is anticipated. Thus, a likely indirect, temporary, short term and **negligible,** effect is anticipated on this MCZ (**not significant**).

8.8.49. The River Thames and Its Tidal Tributaries SINC is of Regional/County importance, and the magnitude of impact from wave wash is assessed as negligible (see **Paragraph 8.8.45**). Thus, there is likely to be direct and indirect, temporary, short term and **negligible,** effect on the SINC (**not significant**).

8.8.50. Intertidal habitats (i.e., mudflat and saltmarsh) are assessed as Regionally/County important and subtidal mudflats are assessed as being of Local importance. Due to the reasons set out in **Paragraph 8.8.13**, the impoverished nature of the infaunal community and the location of the saltmarsh (approximately 500m upstream) of the Proposed Jetty in a small, sheltered embayment, the magnitude of impact is assessed as negligible. Therefore, a likely direct, temporary, short term and **negligible,** effect is anticipated on intertidal mudflat, saltmarsh and subtidal habitat (**not significant**).

Species (marine plants and macroalgae, fish, marine mammals and INNS)

8.8.51. For marine plants and macroalgae of Local importance (excluding saltmarsh communities), the magnitude of impact is assessed as negligible. Consequently, there is likely to be a direct, temporary, short term and **negligible,** effect on marine plants and macroalgae (**not significant**).

8.8.52. Fish are assessed as being of Regional/County to National importance, depending on species, as set out in **Paragraph 8.8.16**. For the reasons outlined in **Paragraph 8.8.45**, there will be a negligible magnitude of impact on habitats that may support fish. Therefore, there is likely to be an indirect, temporary, short term and **negligible,** effect on fish (**not significant**).

Spread of INNS

8.8.53. There is the potential for the introduction and increased spread of INNS within the marine environment as a result of construction activities. These include:

- introduction of new vessels, equipment and infrastructure into the River Thames from other waterbodies during construction of the Proposed Jetty and potential demolition of Belvedere Power Station Jetty (disused)[g];
- increased vessel movements during construction for the Proposed Jetty and potential demolition of the Belvedere Power Station Jetty (disused)[g]; and
- creation of opportunities for organisms to settle of spread through habitat creation or disturbance.

8.8.54. These activities have the potential to increase the risk of spread of INNS in the marine environment. The potential pathway for INNS from other waterbodies to enter the River Thames is potentially via the release of ballast water from vessels, containing INNS larvae and pre-existing biofouling of vessels, equipment and infrastructure. The introduction and spread of INNS can also occur indirectly by creating opportunities for organisms to settle or spread through habitat creation or disturbance due to out-competing native species. Provision of local materials should be used where practicable, and materials should be appropriately treated to minimise the potential spread of INNS.

[g] Vessel traffic would be reduced if the Belvedere Power Station Jetty is to be retained.

8.8.55. In terms of the baseline environment, there are already numerous INNS in the Thames and consequently this watercourse is regarded as one of the most heavily invaded river systems in the world and it is monitored for their presence[88]. In terms of mitigation, the Proposed Scheme will not prevent or inhibit the removal (or current management practices) of aquatic INNS that may be currently undertaken within the River Thames. Furthermore, it is expected that vessels will follow standard procedures for managing INNS in their ballast water. A Biosecurity Management Plan will be developed as part of the CoCP (post consent) and implemented with standard biosecurity measures. This will promote the effective cleaning of all marine equipment and infrastructure (if, utilised in other waterbodies), along with preventing the release of any subsequent waste arisings back into the marine environment. Relevant guidance such as the Check, Clean, Dry campaign led by the GB Non-native Species Secretariat will also be followed. The supply route of vessels, equipment and infrastructure in the Study Area will be determined as part of subsequent work in the ES.

8.8.56. With appropriate and effective mitigation and management measures in place and considering the current status of INNS within the Thames, it is anticipated that the magnitude of impact is likely to be low.

8.8.57. The Medway Estuaries MCZ Zone 1 & 2 is of National importance. European smelt may rely on habitats within the Study Area. Due to the reasons previously set out in **Paragraphs 8.8.52** to **8.8.54**, a low magnitude of impact is anticipated. Thus, a likely indirect, temporary, medium term and **moderate, adverse** effect is anticipated on this MCZ (**significant**).

8.8.58. The River Thames and Its Tidal Tributaries SINC is of Regional/County importance, and the magnitude of impact is assessed as low (see **Paragraph 8.8.52** to **8.8.54**). Thus, there is likely to be direct and indirect, temporary, short term and **moderate, adverse** effect on the SINC (**significant**).

8.8.59. The intertidal mudflat and saltmarsh and its associated benthic communities are considered to be of Regional/County importance. The magnitude of impact is assessed as low (see **Paragraph 8.8.52** to **8.8.54**). Therefore, there is likely to be a direct, permanent, long term and **moderate adverse** effect on intertidal habitats (**significant**).

8.8.60. Subtidal habitat and its associated benthic communities is considered to be of Local importance, which is based upon the impoverished nature of the benthic community present, the absence of any species of conservation importance and the high recovery rate of communities. The magnitude of impact is considered to be low (see **Paragraph 8.8.52** to **8.8.54**). Therefore, there is likely to be a direct, permanent, long term, **negligible,** effect on subtidal benthic communities (**not significant**).

8.8.61. For marine plants and macroalgae of Local importance (excluding saltmarsh communities), the magnitude of impact is assessed as low. Consequently, there is likely to be a direct, temporary, short term and **negligible,** effect on marine plants and macroalgae (**not significant**).

8.8.62. Fish are of Regional/County to National importance depending on species, as set out in **Paragraph 8.8.16**. For the reasons outlined in **Paragraph 8.8.52** to **8.8.54**, there will be a low magnitude of impact on habitats that may support fish. Therefore, there is likely to be an indirect, temporary, medium term and **moderate, adverse** effect on fish species of national importance (**significant**).

OPERATION PHASE

8.8.63. The potential likely significant effects for marine biodiversity associated with the operational phase of the Proposed Scheme are set out in the following sections.

Loss or Disturbance of Habitat

8.8.64. There is potential for loss or disturbance of habitat during the long-term operation of the Proposed project due to:

- Disturbance to the subtidal habitat due to periodic maintenance dredging of the Proposed Jetty.

8.8.65. The long-term loss of subtidal habitat (Option 2) and intertidal habitat (Option 3) from the construction of the Proposed Jetty and the potential gain of intertidal habitat due to the removal of the Belvedere Power Station Jetty (disused) has been assessed above for the construction phase in **Paragraphs 8.8.14 to 8.8.15** and therefore is not also assessed here, despite the loss continuing during the lifetime of the Proposed Scheme. As the Proposed Scheme is located within an area which is known for being highly turbid, with high levels of suspended sediment, there is potential for some backfilling of dredged areas, however, the extent is currently unknown. Therefore, the exact volumes and frequency of maintenance dredging cannot be confirmed at this stage and is also dependent on the final design of the Proposed Jetty. Further detail on the maintenance dredging required will be assessed accordingly in the ES. Due to many of the reasons highlighted in the assessment of the construction phase, pre-existing disturbance from capital dredging, potential for maintenance dredging occurring over a smaller area than capital dredging and embedded mitigation, the magnitude of impact is likely to be negligible, with a precautionary low for some receptors.

8.8.66. The Medway Estuary MCZ Zone 1 & 2 sites are a protected area of National importance. There will be no direct effects on the MCZ due to its location being (approximately) 25km downstream and therefore there are only potential indirect effects on European smelt. Based on the impact being of a low magnitude, there is likely to be an indirect, temporary, long term (intermittent) and **moderate, adverse** effects on the MCZ (**significant**).

8.8.67. The River Thames and its Tidal Tributaries SINC is of Regional/County importance, designated for various habitats (mudflats, saltmarsh and river channel) and fish species. A low magnitude of impact is anticipated. Therefore, there is likely to be a direct and indirect, temporary, long term (intermittent) and **moderate, adverse** effect on the SINC (**significant**).

8.8.68. Intertidal mudflat and saltmarsh of Regional/County importance are unlikely to be adversely affected by maintenance dredging, as this will take place in the subtidal environment and due to some of the reasons highlighted in **Paragraph 8.8.13,** including the already impoverished nature and high recoverability to disturbance. A negligible magnitude of impact is anticipated. Therefore, there is likely to be an indirect, temporary, long term (intermittent) **negligible,** effect on intertidal habitats (**not significant**).

8.8.69. For subtidal habitat of Local importance and for many of the reasons highlighted previously, such as high their impoverished nature and high level of recoverability (see **Paragraph 8.8.14**), the magnitude of impact is a precautionary low. Therefore, there is likely to be a direct, temporary, long term (intermittent), **negligible,** effect on subtidal habitat and its associated benthic communities (**not significant**).

8.8.70. Marine plants and macroalgae (excluding saltmarsh) are regarded as being of Local importance as they are commonly occurring species. The magnitude of impact is negligible. Therefore, there is likely to be an indirect, temporary, long term (intermittent) **negligible,** effect on marine plants and macroalgae (**not significant**).

8.8.71. For the assessment of effects on fish as presented in **Paragraph 8.8.16**, the sensitivity of these receptors ranges from Regional/County to National importance, depending on species. The Regional/County sensitivity is due to the presence of species of low conservation value and high commercial value within the Study Area of the Proposed Scheme including sea bass, dover sole and flounder. The National sensitivity is due to the presence of critically endangered European eel and European smelt which are a Species of Principal Importance, within the Study Area of the Proposed Scheme. The magnitude of impact is a precautionary low.

8.8.72. Therefore, there is anticipated to be an indirect, temporary, long term (intermittent) **moderate, adverse** effect on European eel and European smelt (as well as other fish species of national importance) (**significant**). Other species of national importance will be assessed in the ES. For those of regional importance, there is anticipated to be an indirect, temporary, long term (intermittent), **moderate adverse** effect on these other fish species (**significant**).

8.8.73. Marine mammals (grey seals, harbour seals and harbour porpoises) are assessed to be of National importance. Due to many of the reasons highlighted previously in **Paragraph 8.8.63,** such as small area and recoverability of habitats, the magnitude of impact is negligible. Therefore, there is likely to be an indirect, temporary, long term (intermittent), **negligible,** effect on marine mammals (**not significant**).

Water Quality and Release of Contaminants

8.8.74. The changes in water and sediment quality that could potentially occur as a result of the Proposed Scheme are presented in **Chapter 11: Water and Flood Risk (Volume 1)**. These include but are not limited to:

- changes to water and sediment quality from increased levels of suspended solids, mobilisation of sediment bound contaminants and subsequent sediment deposition due to maintenance dredging;
- changes to the water and sediment quality due to the release of chemical contaminants from a potential discharge from the cooling plant into the marine environment;
- increases in water temperature due to a potential discharge from the cooling plant into the marine environment; and
- changes in water quality due to accidental fuel leaks.

8.8.75. As detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, the discharge will either go to the local foul sewer and thus, there will be no impact on the River Thames or directly into the River Thames from the Proposed Jetty. If the latter option is selected, there is potential for effects on marine ecological receptors. The detail on contaminants and concentrations is still to be confirmed, but the discharge will have a temperature that is +/-5^{o}C from the in-situ River Thames water. As the discharge flow velocity will be approximately 0.012m^{3}/s and has the potential to be less in the winter months due to increased efficiency in cooling system, this is a relatively small discharge. Furthermore, as the discharge will be located off the Proposed Jetty, there is potential for rapid dilution in the subtidal environment and therefore potential localised effects if Jetty Option 2 or 3 are selected, if Jetty Option 3 is selected, it may have impacts upon the intertidal mudflats. If the discharge is also perched, this may also aid the cooling process and limit subsequent potential cleaning/treating of the outfall for biofouling, which is a likely requirement, if placed directly into the water. Nevertheless, any future discharge will comply with any future environmental permits granted by the regulators. With the mitigation measures in place, a subsequent magnitude of negligible to low is currently anticipated, however, this will be confirmed as part of the ES.

8.8.76. The risk of effects arising from accidental fuel leaks from vessels during the operation phase will be managed through the OEPRP, will be prepared and submitted alongside the application for development consent. Furthermore, all vessels will act in accordance with their own management / accident plans, as well as those of the Port of London Authority/Maritime Coastal Agency, thus limiting the potential for accidental fuel leaks as low as reasonably practicable. Consequently, a negligible to low magnitude of impact is envisaged, which will be confirmed as part of the ES. An assessment will be undertaken on the same receptors as identified in **Paragraph 8.8.20**.

Noise and Vibration

8.8.77. The changes in noise and vibration that could occur as a result of operational activities associated with the Proposed Scheme are presented in **Chapter 6: Noise and Vibration (Volume 1)**. These include noise and vibration generated from:

- maintenance dredging; and
- operational vessel movements.

8.8.78. It is currently unclear as to the frequency, techniques and areas that may be subject to maintenance dredging for the larger vessels that may dock in the area, however, it is likely to be less than capital dredging. In terms of underwater noise impacts, there is already existing low vessel activity in the Study Area and greater vessel activity occurring elsewhere in the wider River Thames (see **Paragraph 8.8.42**). Routine maintenance dredging also takes place across the River Thames.

8.8.79. Potential effects of noise and vibration on marine mammals and fish are described above for construction, (see **Paragraph 8.8.23**). As operational vessels and dredging vessels will be operating at slow speeds and due to high manoeuvrability of marine mammals and fish, these species may exhibit some behavioural effects by simply moving away from vessels and dredging activity. There may also be some habituation to existing vessel activity and associated noise and vibration. Nevertheless, generic mitigation for other impacts associated with dredging (e.g., potential increases in suspended sediments), may require maintenance dredging to be undertaken outside of key sensitive periods for fish and this will need to be agreed with the Environment Agency, Natural England and PLA.

8.8.80. For these reasons, along with the likely small area of the River Thames that will undergo maintenance dredging, and the small increase in vessel traffic, with large unaffected areas remaining undisturbed, it is likely that fish and marine mammals will have sufficient alternative space to utilise and easily pass by, and therefore a negligible magnitude of impact is anticipated. An assessment of noise from maintenance dredging on sensitive receptors is provided in the following paragraphs. This assessment is based upon Option 2 for the Proposed Jetty which is considered the worst-case location for fish and marine mammals as they are more likely to be present within the vicinity of Option 2 as it is further into the channel.

8.8.81. For the Medway Estuaries MCZ Zone 1 & 2 of National importance, there will be no direct effect on this site and features within the MCZ, due to the approximate 25km downstream distance of this site from the Site Boundary. For European smelt, that may utilise habitats within the Study Area, a negligible magnitude of impact is predicted due to the reasons highlighted in **Paragraphs 8.8.71** to **8.8.73.** Thus, a likely indirect, temporary, long term (intermittent) and **negligible,** effect is anticipated on this nationally designated site and its features (**not significant**).

8.8.82. The River Thames and its Tidal Tributaries SINC are assessed as being of Regional/County importance and therefore the magnitude of impact is assessed as negligible. Therefore, there is a likely to be a direct, temporary, long term (intermittent) and **negligible,** effect on this non-statutory designated site and its features (**not significant**).

8.8.83. For fish of Regional/County and National importance, a negligible magnitude of impact is likely. Therefore, there is likely to be a direct, temporary, long term (intermittent) and **negligible,** effect on fish (**not significant**).

8.8.84. For marine mammals (grey seals, harbour seals and harbour porpoise) which are of National importance, the magnitude of impact is considered to be negligible. Therefore, there is likely to be a direct, temporary, long term (intermittent) and **negligible,** effect on marine mammals (**not significant**).

Lighting

8.8.85. There are operational lighting arrangements for Riverside 1 (including the adjacent Middleton Jetty) and these will be in place for Riverside 2 once the construction of it is complete. Any new lighting for the Proposed Scheme will comply with the relevant design standards and mitigation measures set out in embedded mitigation (see **Section 8.7)**. Lighting arrangements will be further determined as part of the design development (with appropriate controls for the protection of ecological receptors) and assessed accordingly in the ES. An Outline Lighting Strategy will also be produced for this Proposed Scheme and will be submitted with the application for development consent, to minimise lighting impacts to designated areas, habitats and species.

8.8.86. Further, generic mitigation for lighting is described above for the construction phase, and the principles will also be applied for operational lighting (see **Paragraph 8.8.31**) and will be confirmed in the Outline Lighting Strategy submitted with the DCO application. The potential range of effects on marine ecological receptors was also described previously (see **Paragraph 8.8.32**). There are differences, however, in that operational lighting will be permanent and long term. Nevertheless, there is already a considerable amount of operational light affecting the wider River Thames and therefore marine ecological receptors all along the Thames. With the implementation of mitigation and consideration that only a small portion of the River Thames will be affected, along with the likely turbid nature of the Thames in this locality, the magnitude is likely to be localised and negligible. The assessment of light on marine ecological receptors is provided in the following sections:

8.8.87. The Medway and Estuaries MCZ Zone 1 & 2 of National importance is located 26km downstream of the Site Boundary, thus, there will be no direct effects of operational lighting on the many of the features of importance within the MCZ. However, for European smelt which utilise the wider River Thames, there is potential for an indirect effect on this MCZ. With the implementation of the proposed mitigation and in consideration of the current baseline, the magnitude of impact is considered to be negligible. Therefore, there is likely to be an indirect, temporary, long term and **negligible,** effect (**not significant**) on the MCZ.

8.8.88. The River Thames and its Tidal Tributaries SINC, is assessed as being of Regional importance for habitats and fish. The magnitude of impact resulting from lighting is considered to be negligible for many of the reasons highlighted previously in **Paragraphs 8.8.84** to **8.8.85** (i.e., large existing amount of lighting operational light already along the Thames)**.** Thus, there is likely to be a direct and indirect, long term, **negligible,** effect on this SINC (**not significant**).

8.8.89. Marine habitats, including saltmarsh and intertidal mudflats are assessed as being of Regional importance and subtidal mudflats of Local importance. Due to the impoverished nature of the associated benthic communities and predominantly living in the sediment, subsequent effects will be minimal. Furthermore, as the saltmarsh is located at least approximately 500m away from the Proposed Jetty, this habitat is likely to be outside of the Study Area for marine lighting impacts, with the proposed mitigation. Therefore, there is likely to be a direct, temporary, long term and **negligible,** effect on habitats (**not significant**).

8.8.90. The importance of marine plants and macroalgae (excluding saltmarsh) is Local. The effects of lighting can increase photosynthetic rates, however, with the implementation of proposed mitigation and likely localised effects within the subtidal habitat, a negligible magnitude is anticipated. Therefore, there is likely to be a direct, temporary, long term and **negligible,** effect on these receptors (**not significant**).

8.8.91. The importance of phytoplankton and zooplankton is considered to be Local. Behaviour to light and predation is described above in respect of the construction phase (see **Paragraphs 8.8.32** and **8.8.38**). Due to the current baseline in the Thames, proposed mitigation and likely localised effects, a negligible magnitude is anticipated. Therefore, there is likely to be direct and indirect, temporary, long term and **negligible,** effect on these receptors (**not significant**).

8.8.92. Fish range from Regional to National importance, depending on species. Due to the current lighting baseline across the wider Thames, proposed mitigation and likely localised effects, the magnitude of impact is assessed as negligible. Therefore, there is likely to be indirect and direct, temporary, long term and **negligible,** effects on fish (**not significant**).

8.8.93. For marine mammals, which are of National importance, a likely negligible magnitude of impact is anticipated. Therefore, there is likely to be an indirect, temporary, long term and **negligible,** effect on grey seals, harbour seals and harbour porpoises (**not significant**).

Vessel Strikes

8.8.94. There is the potential for an increase in vessel strikes as a result of operational activities associated with the Proposed Scheme, resulting from:

- an increase in vessel numbers within the Study Area due to the operation of the Proposed Jetty and routine maintenance dredging.

8.8.95. As outlined in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, based on a preliminary operational capacity assessment, up to five marine vessels will call at the Proposed Jetty each week to collect and transport LCO_2 to meet the annual throughput. In order to accommodate changes in vessel types, the Proposed Jetty will be designed to accommodate marine vessels with a capacity of up to 15,000m^3 per vessel, which would result in a lower number of calls per week than the five previously referenced. There will also be up to ten tug movements from the rear of the Proposed Jetty structure. Vessels will be travelling at speeds slower than those already passing the Study Area and are likely to be around 3 knots. Therefore, the magnitude of the change is assessed as negligible due to the slow operating speed of the vessels (see **Paragraph 8.8.42**).

8.8.96. The highly manoeuvrable nature of marine mammals means they are readily able to avoid vessels within the area, especially boats travelling at low speeds. Furthermore, as there are sufficient unaffected areas for marine mammals to reside in or pass by, the potential for adverse effects is minimised.

8.8.97. Consequently, for marine mammals (grey seals, harbour seals and harbour porpoises) of National importance, these receptors are likely to experience a direct, temporary, long term and **negligible, effect (not significant)**.

Changes in Suspended Sediment Concentrations and Subsequent Sediment Deposition on the Benthic Environment

8.8.98. Changes in suspended sediment concentrations, mobilisation of potentially sediment bound contaminants and subsequent sediment deposition, will depend upon the chosen maintenance dredging option. It is possible that due to the existing high suspended sediment concentrations and sediment deposition in the area (hence the requirement for maintenance dredging), that the magnitude of effects will be negligible on marine ecological receptors, especially following capital dredging. However, there is also potential for suspended sediment bound contaminants to be subsequently deposited into the deeper dredge pockets from elsewhere and other activities upstream. Consequently, mitigation involving regular sediment testing of the infilling areas will be brought forward and/or suitable subsequent appropriate dredging techniques will be selected that minimise the dispersion of sediment. The impact from changes to suspended sediments will be assessed in the ES.

Increased Wave Wash

8.8.99. The pNHA carried out in August 2023 is described above (see **Paragraph 8.8.42**). In summary, the report stated that vessel traffic is lower in the Study Area compared to other areas and vessel speeds ranged from 3-13 knots. During the operation of the Proposed Scheme, vessels will be travelling at slow speeds for dredging operations, as well as delivery and collection of LCO_2 from the Proposed Jetty. Consequently, there is unlikely to be a change in the level of wave wash created by the vessels, thus, there is likely to be negligible change in magnitude.

8.8.100. For the Medway Estuaries MCZ Zone 1 & 2 of National importance, direct impacts on this MCZ are unlikely, due to its (approximately) 25km downstream distance from the Site Boundary. Therefore, there is likely to be only an indirect, temporary, long term and **negligible,** effect on the MCZ (due to presence of European smelt within the Study Area) (**not significant**).

8.8.101. For the River Thames and its Tidal Tributaries SINC of Regional importance and for the reasons highlighted previously in **Paragraph 8.8.97**, the magnitude of impact is assessed as negligible. Thus, there is potential for a likely direct, long- term and **negligible**, effect on the SINC (**not significant**).

8.8.102. Subtidal habitat and associated benthic communities are assessed as Locally important, based upon the impoverished nature of the community and absence of any infaunal species of conservation importance. The magnitude of impact is assessed to be negligible due to the reasons outlined in **Paragraph 8.8.97**. Thus, a likely direct, long term and **negligible,** effect is anticipated on subtidal habitat and associated infaunal benthic communities (**not significant**).

8.8.103. For intertidal habitats (i.e., mudflat and saltmarsh) of Regional/County importance, the magnitude of impact is assessed to be negligible. Therefore, there is likely to be a direct, long term and **negligible**, effect on intertidal mudflat and saltmarsh communities (**not significant**).

8.8.104. For marine plants and macroalgae of Local importance (excluding saltmarsh communities), the magnitude of impact is assessed to be negligible due to the information provided in **Paragraph 8.8.97**. Consequently, there is likely to be a direct, long term and **negligible,** effect on marine plants and macroalgae (**not significant**).

8.8.105. For all fish of Regional to National importance, the magnitude of impact is negligible on habitats that may support fish (see **Paragraph 8.8.97**). Therefore, there is likely to be indirect, long term and **negligible,** effect on fish (**not significant**).

8.8.106. For the assessment of effects on marine mammals (grey seals, harbour seals and harbour porpoise) of National importance, the magnitude of impact is assessed to be negligible on potential supporting habitats (see **Paragraph 8.8.97**). Thus, there is likely to be an indirect, long term and **negligible**, effect on marine mammals (**not significant**).

Spread of INNS

8.8.107. There is a potential risk of spread of aquatic INNS as a result of operational activities, which include:

- introduction of new vessels and increased vessel movements for maintenance dredging and transportation of LCO_2 from the Proposed Jetty; and
- increases in water temperature due to discharge from the cooling plant into the marine environment.

8.8.108. There is a potential for the introduction and increased risk for the spread of INNS from vessels into the River Thames. **Paragraphs 8.8.51** to **8.8.53** set out information on potential pathways for marine INNS and their current status in the River Thames. The Biosecurity Management Plan to be produced as part of the CoCP will cover the operation phase, as well as construction.

8.8.109. There is potential for the water temperature to increase within the Study Area, which may facilitate the spread of INNS[90]. There is still some uncertainty regarding the location of the discharge, however, if it was to be perched from the Proposed Jetty Option 2 into the subtidal environment, this could potentially aid a reduction in temperature, along with subsequent dilution in the Thames. However, if the Proposed Jetty Option 3 is selected, it will result in water discharging over intertidal mudflats, which may result in changes to the macrofaunal community. Due to the relatively small discharge in terms of flow and volume, it is anticipated that potential effects will be fairly localised and unlikely to promote the rate of spread of INNS within the River Thames. Due to ongoing design development, a precautionary low magnitude of impact is anticipated at this stage. An assessment of the effects from the discharge on the spread of INNS will be included within the ES.

8.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

8.9.1. The initial additional design, mitigation and enhancement measures being considered by the Applicant are listed below. These options will be further developed during ongoing design development and confirmed within the ES and application for development consent:

8.9.2. An additional design feature of the Proposed Scheme could be the installation of tidal terracing on the river wall, which could increase intertidal habitat. If retained, ecological enhancements e.g., the inclusion of rope on pier legs to mimic algae and marine plants, could be included, where practicable, to increase habitat heterogeneity and therefore encourage settlement. This could also be applied to the Proposed Jetty structure, this will be explored as part of ongoing design development.

8.9.3. Ecological mitigation and enhancement measures will be explored further as the design of the Proposed Scheme progresses.

8.9.4. Development of a construction phase INNS Management Plan as an appendix to the CoCP (to be developed in accordance with the OCoCP) which will include measure to reduce the risk of INNS spread.

8.10. MONITORING

8.10.1. Monitoring to determine the potential presence of INNS would aid the implementation of an INNS Management Plan (as part of the CoCP).

8.10.2. If discharge is to an outfall into the River Thames, long term monitoring of the effects of the discharge on fish and benthic invertebrates is likely to be appropriate. A monitoring programme would be agreed in consultation with the Environment Agency, PLA, Natural England and Thames Water.

8.10.3. As the Study Area is a highly depositional area, there is potential for contaminated sediments to be subsequently deposited in dredged berths from elsewhere. This may determine the operational dredging technique and disposal route which will subsequently determine the impacts upon marine receptors. Regular sediment contaminant surveys may be required in support of ongoing maintenance dredging operations.

8.11. RESIDUAL EFFECTS

8.11.1. **Table 8-16** below summarises the residual effects associated with the Proposed Scheme, as assessed at this stage of the EIA. Effects have not been included where a significance has not been determined due to insufficient information available. This includes effects from noise and vibration and changes in water quality.

Table 8-16: Marine Biodiversity – Summary of Residual Effects

Description of the effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual effect
Construction Phase				
Loss or disturbance of habitat[h]	Medway Estuary MCZ	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.9**. Including the potential creation of additional habitat through tidal terracing on the existing river wall and the addition of ecological enhancements e.g., the inclusion of rope on pier legs to mimic algae and marine plants. These enhancement measures could be applied to the Proposed Jetty structure. To be explored in further detail in the ES.	**Minor Adverse (not significant)**
	River Thames and Tidal Tributaries SINC	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.9**. Including the potential creation of additional habitat through the potential tidal terracing on the existing river wall and the addition of ecological enhancements e.g., the inclusion of rope on pier legs to mimic algae and marine plants. These enhancement measures could be applied to the Proposed Jetty structure. To be explored in further detail in the ES.	**Minor Adverse (not significant)**

[h] This includes the potential removal or retention of the Belvedere Power Station Jetty (disused).

Description of the effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual effect
	Intertidal mudflat, saltmarsh and associated communities	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.9**. Including the potential creation of additional habitat through tidal terracing on the existing river wall and the addition of ecological enhancements e.g., the inclusion of rope on pier legs to mimic algae and marine plants. These enhancement measures could be applied to the Proposed Jetty structure. To be explored in further detail in the ES.	**Minor Adverse (not significant)**
	Subtidal habitats and associated communities	**Negligible (not significant)**	None required.	**Negligible (not significant)**
	Marine plants and Macroalgae	**Negligible (not significant)**	None required.	**Negligible (not significant)**
	Fish of National importance	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.9**. Including the potential creation of additional habitat through tidal terracing on the existing river wall and the addition of ecological enhancements e.g., the inclusion of rope on pier legs to mimic algae and marine plants. These enhancement measures could be applied to the Proposed Jetty structure.	**Minor Adverse (not significant)**

Description of the effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual effect
			To be explored in further detail in the ES.	
	Marine mammals	**Negligible (not significant)**	None required.	**Negligible (not significant)**
Changes in water quality and release of contaminants	Medway Estuary MCZ, River Thames and Tidal tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and macroalgae, fish, marine mammals	This will be assessed in detail the ES chapter once full sediment contaminant analysis and sediment transport modelling has been completed.	To be determined within the ES chapter.	To be determined in the ES chapter.
Noise and Vibration[h]	Medway Estuary MCZ, Fish, marine mammals	This will be assessed in detail in the ES chapter once noise modelling results are available.	To be determined within the ES chapter.	To be determined in the ES chapter.
Lighting[h]	Medway Estuary MCZ, River Thames and Tidal	**Negligible (not significant)**	None required.	**Negligible (not significant)**

Description of the effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual effect
	tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and macroalgae, fish, marine mammals			
Vessel Strike[h]	Marine Mammals	**Negligible (not significant)**	None required.	**Negligible (not significant)**
Change in suspended sediment levels and subsequent sediment deposition	Medway Estuary MCZ, River Thames and Tidal tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and macroalgae, fish, marine mammals	This will be assessed in detail the ES chapter once full sediment contaminant analysis and sediment transport modelling has been completed.	To be determined within the ES chapter.	To be determined in the ES chapter.

Description of the effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual effect
Increased wave wash	Medway Estuary MCZ, River Thames and Tidal tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and macroalgae, fish	**Negligible (not significant)**	None required.	**Negligible (not significant)**
Spread of INNS[h]	Medway Estuary MCZ	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.10**. Including monitoring of INNS to aid implementation of an INNS Management Plan.	**Minor Adverse (not significant)**
	River Thames and Tidal Tributaries SINC	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.10**. Including monitoring of INNS to aid implementation of an INNS Management Plan.	**Minor Adverse (not significant)**
	Intertidal mudflat, saltmarsh and associated communities	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.10**. Including monitoring of INNS to aid implementation of an INNS Management Plan.	**Minor Adverse (not significant)**

Description of the effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual effect
	Subtidal habitats and associated benthic communities	**Negligible (not significant)**	None required.	**Negligible (not significant)**
	Marine plants and macroalgae	**Negligible (not significant)**	None required.	**Negligible (not significant)**
	Fish	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.10**. Including monitoring of INNS to aid implementation of an INNS Management Plan.	**Minor Adverse (not significant)**
Operation Phase				
Loss or disturbance of habitat	Medway Estuary MCZ	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.9**. Including the potential creation of additional habitat through tidal terracing on the existing river wall and the addition of ecological enhancements e.g., the inclusion of rope on pier legs to mimic algae and marine plants. These enhancement measures could be applied to the Proposed Jetty structure. To be explored in further detail in the ES.	**Minor Adverse (not significant)**
	River Thames and Tidal	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.9**. Including the potential creation of additional	**Minor Adverse (not significant)**

Description of the effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual effect
	Tributaries SINC		habitat through tidal terracing on the existing river wall and the addition of ecological enhancements e.g., the inclusion of rope on pier legs to mimic algae and marine plants. These enhancement measures could be applied to the Proposed Jetty structure. To be explored in further detail in the ES.	
	Intertidal mudflat and saltmarsh and associated communities	**Negligible (not significant)**	None required.	**Negligible (not significant)**
	Subtidal habitats and associated benthic communities	**Negligible (not significant)**	None required.	**Negligible (not significant)**
	Marine plants and macroalgae	**Negligible (not significant)**	None required.	**Negligible (not significant)**
	Fish	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.9**. Including the potential creation of additional habitat through tidal terracing on the existing	**Minor Adverse (not significant)**

Description of the effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual effect
			river wall and the addition of ecological enhancements e.g., the inclusion of rope on pier legs to mimic algae and marine plants. These enhancement measures could be applied to the Proposed Jetty structure. To be explored in further detail in the ES.	
	Marine mammals	**Negligible (not significant)**	None required.	**Negligible (not significant)**
Water quality and release of contaminants	Medway Estuary MCZ, River Thames and Tidal tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and macroalgae, fish, marine mammals	This will be assessed in detail the ES chapter once full sediment contaminant analysis and sediment transport modelling has been completed.	To be determined within the ES chapter.	To be determined in the ES chapter.
Noise and vibration	Medway Estuary MCZ, River Thames	**Negligible (not significant)**	None required.	**Negligible (not significant)**

Description of the effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual effect
	and Tidal tributaries SINC, Fish, marine mammals			
Lighting	Medway Estuary MCZ, River Thames and Tidal tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and macroalgae, fish, marine mammals	**Negligible (not significant)**	None required.	**Negligible (not significant)**
Vessel strikes	Marine mammals	**Negligible (not significant)**	None required.	**Negligible (not significant)**
Changes in suspended sediment concentrations	Medway Estuary MCZ, River Thames and Tidal	This will be assessed in detail the ES chapter once full sediment contaminant analysis	To be determined within the ES chapter.	To be determined in the ES chapter.

Description of the effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual effect
and subsequent sediment deposition	tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and macroalgae, fish, marine mammals	and sediment transport modelling has been completed.		
Increased wave wash	Medway Estuary MCZ, River Thames and Tidal tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and macroalgae, fish, marine mammals	**Negligible (not significant)**	None required.	**Negligible (not significant)**
Spread of INNS	Medway Estuary MCZ, River Thames	This will be assessed in detail the ES chapter once full sediment	To be determined within the ES chapter.	To be determined in the ES chapter.

Description of the effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual effect
	and Tidal tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and macroalgae, fish, marine mammals	contaminant analysis and sediment transport modelling has been completed.		

8.12. NEXT STEPS

8.12.1. Further work to be completed and included in the ES comprises:

- The marine biodiversity assessment will be further developed and refined based on any relevant responses to the Statutory Consultation, ongoing design development and ongoing engagement with stakeholders.
- The assessment within the ES will involve a review of the marine biodiversity assessment presented in this chapter, based on further information as part of ongoing design development.
- Completion of ecological survey work and reporting of results.
- Evaluation of habitats for their biodiversity value using Defra's biodiversity metric (currently version 4) to inform the Proposed Scheme's landscape masterplan and Biodiversity Net Gain assessment.
- Development of the Proposed Scheme's landscape masterplan, incorporating plans for habitat creation and enhancement within the marine environment.
- Development of detailed mitigation proposals for protected species, including timings of works to avoid sensitive periods and utilising Best Available Technology (BAT).
- An assessment on the effects of noise and vibration associated with the construction and operation of the Proposed Scheme upon marine mammals and fish based upon results from noise modelling undertaken to inform the ES.
- An assessment on the effects of changes to water quality and sediment during construction and operation on sensitive receptors, based upon the results of the sediment modelling (described in **Chapter 11: Water Environment and Flood Risk (Volume 1).**
- In order to determine what concentrations and contaminants are present at the depth of capital dredging, a further survey is required for sediment collection and analysis. Results may influence the dredging techniques used and therefore the impacts upon marine receptors and subsequent assessments as part of the ES. These surveys will form part of the detailed design stage of the Proposed Scheme.

8.13. LIMITATIONS AND ASSUMPTIONS

8.13.1. This section outlines the limitations, uncertainties, and assumptions made in undertaking marine biodiversity reported in this technical chapter:

- The assessment presented in this chapter is limited by there being incomplete marine surveys at the time of writing, which will be on-going during the autumn of 2023. However, sufficient information was available to determine residual effects of the Proposed Scheme for the majority of marine biodiversity features. Where insufficient information is available from surveys, this has been made clear.

8.14. REFERENCES

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DECARBONISATION

CHAPTER 9: HISTORIC ENVIRONMENT

Cory Decarbonisation Project

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TABLE

9. HISTORIC ENVIRONMENT

9.1. INTRODUCTION

9.1.1. This chapter reports the preliminary assessment of the likely significant effects of the Proposed Scheme on the historic environment topic during construction and operation and describes:

- relevant policy, legislation and guidance;
- consultation and engagement undertaken to date;
- the methodology for assessment;
- potential effects resulting from the construction phase; and
- potential effects resulting from the operation phase.

9.1.2. This chapter is intended to be read alongside **Appendix 9-1: Historic Environment Baseline Report (Volume 3)**, which contains a full set of illustrations, including historical mapping.

9.2. POLICY, LEGISLATION, AND GUIDANCE

9.2.1. The policy, legislation, and guidance relevant to the assessment of the historic environment for the Proposed Scheme is detailed in **Table 9-1**.

Table 9-1: Historic Environment Summary of Key Policy, Legislation, and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011[1]	Sets out the Government's policy for delivery of major energy infrastructure and is currently the primary basis for decision making of applications within the Planning Act 2008 regime. Section 5.8 relates to the historic environment and sets out policy in relation to harm to the significance of heritage assets. Its requirements relating to the historic environment are broadly similar to those in NPPF (see below): • *"The construction, operation and decommissioning of energy infrastructure has the potential to result in adverse impacts on the historic environment*" (paragraph 5.8.1); • *"The historic environment includes all aspects of the environment resulting from the interaction between people and places through time, including all surviving*

Policy, Legislation or Guidance	Description
	physical remains of past human activity, whether visible, buried or submerged, landscaped and planted or managed flora" (Paragraph 5.8.2); • "*The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage assets affected can be adequately understood from the application and supporting documents*" (Paragraph 5.8.10); • "*In considering the impact of a proposed development on any heritage assets, the IPC should take into account the particular nature of the significance of the heritage assets and the value that they hold for this and future generations*" (Paragraph 5.8.12); • "*Substantial harm to or loss of a grade II listed building or park or garden should be exceptional. Substantial harm to or loss of designated assets of the highest significance, including Scheduled Monuments; registered battlefields; grade I and II* listed buildings; grade I and II* registered parks and gardens; and World Heritage Sites, should be wholly exceptional*" (Paragraph 5.8.14); • "*Any harmful impact on the significance of a designated heritage asset should be weighed against the public benefit of development, recognising that the greater the harm to the significance of the heritage asset the greater the justification will be needed for any loss. Where the application will lead to substantial harm to or total loss of significance of a designated heritage asset the IPC should refuse consent unless it can be demonstrated that the substantial harm to or loss of significance is necessary in order to deliver substantial public benefits that outweigh that loss or harm.*" (Paragraph 5.8.15); and • "*Where loss of significance of any heritage asset is justified on the merits of the new development, the IPC should consider imposing a condition on the consent or requiring the applicant to enter into an obligation that will prevent the loss occurring until it is reasonably certain that the relevant part of the development is to proceed*" (Paragraph 5.8.17).

Policy, Legislation or Guidance	Description
Draft Overarching National Policy Statement (NPS) for Energy EN-1 2023[2]	This Draft Overarching National Policy Statement for Energy (EN-1) is part of a suite of draft NPSs issued by the Secretary of State for DESNZ. It sets out the government's policy for delivery of major energy infrastructure and will likely replace the 2011 NPS by the time the application for the Proposed Scheme is submitted. The requirements relating to the historic environment are broadly similar to those in NPS EN-1 (2011)[1].
National Planning Policy Framework (NPPF) 2023[3]	The NPPF sets out the Government's planning policies for England and how these should be applied by applicants and decision makers. The NPPF sets out the importance of assessing the significance of heritage assets that may be affected by a proposal. Paragraph 194 of the NPPF states that local planning authorities, when determining applications, should require the applicant to: *"describe the significance of any heritage assets affected, including any contribution made by their setting". Paragraph 194 goes on to state that "the level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance".* Heritage assets are defined in Annex 2 of the NPPF as *"a building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. It includes designated heritage assets and assets identified by the local planning authority (including local listing)*." Annex 2 also defines significance as "*the value of a heritage asset to this and future generations because of its heritage interest. The interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting*". Setting is defined as "*the surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve".* Paragraph 197 of the NPPF states that local planning authorities should consider the following when determining planning applications:

Policy, Legislation or Guidance	Description
	• "*the desirability of sustaining and enhancing the significance of heritage assets and putting them to viable uses consistent with their conservation*"; • "*the positive contribution that conservation of heritage assets can make to sustainable communities including their economic vitality*"; and • "*the desirability of new development making a positive contribution to local character and distinctiveness*". Paragraphs 199 to 203 detail the notion that heritage assets can be harmed or lost through alterations, destruction, or from development within their setting. These paragraphs identify that this harm ranges from less than substantial to substantial. The emphasis should be on the conservation of designated heritage assets, regardless of whether any potential harm is considered to be substantial or less than substantial (paragraph 199). As a rule, the more important the heritage asset is, the greater the weight should be on its conservation. Substantial harm to or loss of assets of the highest significance (scheduled monuments, protected wreck sites, registered battlefields, Grade I and II* listed buildings, Grade I and II* registered parks and gardens, and World Heritage Sites (paragraph 200) should be wholly exceptional. Paragraph 201 of the NPPF goes on to state that "*where a proposed development will lead to substantial harm to (or total loss of significance of) a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or total loss is necessary to achieve substantial public benefits that outweigh that harm or loss, or all of the following apply:* *a) the nature of the heritage asset prevents all reasonable uses of the site; and* *b) no viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conservation; and* *c) conservation by grant-funding or some form of not for profit, charitable or public ownership is demonstrably not possible; and*

Policy, Legislation or Guidance	Description
	d) the harm or loss is outweighed by the benefit of bringing the site back into use." With regard to applications concerning non-designated heritage assets *"a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset*" (paragraph 203).
The London Plan 2021[4]	The Spatial Development Strategy for Greater London sets out a framework for how London will develop over the next 20-25 years and the Mayor's vision for 'Good Growth'. Policy HC1 of the London Plan is the key policy specific to the historic environment within Greater London, which states that: *"A. Boroughs should, in consultation with Historic England, local communities and other statutory and relevant organisations, develop evidence that demonstrates a clear understanding of London's historic environment. This evidence should be used for identifying, understanding, conserving, and enhancing the historic environment and heritage assets, and improving access to, and interpretation of, the heritage assets, landscapes and archaeology within their area.* *B. Development Plans and strategies should demonstrate a clear understanding of the historic environment and the heritage values of sites or areas and their relationship with their surroundings. This knowledge should be used to inform the effective integration of London's heritage in regenerative change by:* • setting out a clear vision that recognises and embeds the role of heritage in place-making • utilising the heritage significance of a site or area in the planning and design process • integrating the conservation and enhancement of heritage assets and their settings with innovative and creative contextual architectural responses that contribute to their significance and sense of place • delivering positive benefits that conserve and enhance the historic environment, as well as contributing to the economic viability, accessibility and environmental quality of a place, and to social wellbeing.

Policy, Legislation or Guidance	Description
	C. Development proposals affecting heritage assets, and their settings, should conserve their significance, by being sympathetic to the assets' significance and appreciation within their surroundings. The cumulative impacts of incremental change from development on heritage assets and their settings should also be actively managed. Development proposals should avoid harm and identify enhancement opportunities by integrating heritage considerations early on in the design process. *D. Development proposals should identify assets of archaeological significance and use this information to avoid harm or minimise it through design and appropriate mitigation. Where applicable, development should make provision for the protection of significant archaeological assets and landscapes. The protection of undesignated heritage assets of archaeological interest equivalent to a scheduled monument should be given equivalent weight to designated heritage assets.* *E. Where heritage assets have been identified as being At Risk, boroughs should identify specific opportunities for them to contribute to regeneration and place-making, and they should set out strategies for their repair and reuse*" The London Plan also identifies Opportunity Areas (OA), including the Bexley Riverside OA within which the Site is situated. The Plan recognises Belvedere as having *"potential as a future District centre"*.
The Bexley Local Plan 2023[5]	The Bexley Local Plan, adopted on 26th April 2023, positively plans for sustainable development across the Borough. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. The following policies in the Local Plan are relevant to the historic environment: • Policy SP6: Managing Bexley's Heritage Assets states that "*The Council will manage its heritage and archaeological assets, whilst seeking opportunities to make the most of these assets; including adapting to and mitigating the effects of climate change. This will enhance the local sense of place and support the revitalisation and development of the borough, including*

Policy, Legislation or Guidance	Description
	promoting the visitor economy." In part, this will be achieved by "*promoting the borough's heritage assets, such as Lesnes Abbey, Danson Mansion, Hall Place and Gardens, Crossness Beam Engine House and Red House*" and "*reviewing the status of existing and identifying new heritage and archaeological assets*". • Policy DP14: Development affecting a heritage asset states that "*development proposals with the potential to directly or indirectly impact on a heritage asset or its setting should meet NPPF requirements to describe the significance of the asset and demonstrate how the proposal conserves or enhances the significance of the asset.*" With regard to archaeological evidence, the policy goes on to state that "*development proposals should be assessing the archaeological potential of sites and then retaining, in situ, archaeological evidence within sites, wherever possible. Where archaeological evidence cannot be retained, the appropriate levels of archaeological investigation and recording should be undertaken prior to the redevelopment of the site*."
London Environment Strategy 2018[6]	The London Environment Strategy seeks to ensure that London will become a *"zero carbon city by 2050"* by setting out policies and proposals in seven policy areas to address environmental challenges, including the transition to a low carbon circular economy. The Mayor wants to ensure "*London's businesses and workers are supported to be able to compete effectively in, and benefit from, this growing global market"*. The London Environment Strategy contains the following policies and proposals in relation to the historic environment: • Policy 5.1.2 Protect, conserve, and enhance the landscape and cultural value of London's green infrastructure. • Proposal 5.1.2.a states that "*the Mayor will ensure that opportunities for a complementary relationship between cultural heritage and green infrastructure are fully explored in the interests of good place-making.*"

Policy, Legislation or Guidance	Description
South East Inshore Marine Plan 2021[7]	The South East Inshore Marine Plan area stretches from Felixstowe in Suffolk to west of Dover in Kent and incorporates the River Thames. The South East Inshore Marine Plan is intended to help to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan area. Policy SE-HER-1 relates to the historic environment: • "*Proposals that demonstrate they will conserve and enhance the significance of heritage assets will be supported.* • *Where proposals may cause harm to the significance of heritage assets, proponents must demonstrate that they will, in order of preference:* – avoid – minimise – mitigate ~ any harm to the significance of heritage assets. • *If it is not possible to mitigate, then public benefits for proceeding with the proposal must outweigh the harm to the significance of heritage assets."*
London Borough of Bexley Archaeological Priority Areas Appraisal 2020[8]	Document produced by the Greater London Archaeology Advisory Service (GLAAS) which defines and reviews the Archaeological Priority Areas (APA) within the Borough.
Legislation	
The Planning (Listed Buildings and Conservation Areas) Act 1990	Sets out the legal requirements for the control of development and alterations which affect listed buildings or conservation areas (including buildings of heritage interest which lie within a conservation area). Grade I are buildings of exceptional interest. Grade II* are particularly significant buildings of more than special interest. Grade II are buildings of special interest.

Policy, Legislation or Guidance	Description
Guidance	
National Planning Practice Guidance (2021)[9]	Explains the processes and tools that can be used through the planning system in England. This guidance includes advice on enhancing and conserving the historic environment.
Statement of Significance Note (Historic England, 2019)[10]	Historic England advice note which covers the NPS EN-1 (2011)[1] requirement for applicants for heritage and other consents to describe heritage significance to help local planning authorities to make decisions on the impact of proposals for change to heritage assets.
The Setting of Heritage Assets (Historic England, 2017)[11]	Sets out guidance in managing change within the settings of heritage assets, including archaeological remains and historic buildings, sites, areas and landscapes.
Greater London Archaeological Priority Area Guidelines (Historic England, 2016)[12]	Historic England guidance note which defines APAs and the 'tiered' system introduced to denote different levels of sensitivity to development.
Standard and Guidance for Commissioning Work or Providing Consultancy Advice on Archaeology and the Historic Environment (2020)[13]	Provides special advice to commissioners of archaeological and other historic environment work to ensure sufficient understanding of ethical, legal and policy requirements.
Standard and Guidance for Historic Environment Desk-Based Assessment (2020)[14]	Guidance which seeks to define good practice for the execution and reporting of desk-based assessment in line with the regulations of Chartered Institute for Archaeologists (CIfA), in particular the Code of Conduct.

Policy, Legislation or Guidance	Description
Deposit Modelling and Archaeology: Guidance for Mapping Buried Deposits (2020)[15]	Guidance produced to "*help archaeologists working within the context of development-led projects to understand what deposit models are and the benefits that can be gained by using them*".

9.3. SCOPING OPINION AND CONSULTATION

9.3.1. An EIA Scoping Opinion[16] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26th May 2023. The responses from the Planning Inspectorate and statutory consultees in relation to the historic environment and how these requirements should be addressed by the Applicant are set out in **Table 9-2** below.

Table 9-2: Summary of the EIA Scoping Opinion in relation to the Historic Environment

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Planning Inspectorate			
3.5.1	Potential physical effects on unknown buried heritage assets within the Site (archaeological remains), including potential submerged remains within the Thames foreshore (marine) – operational phase.	*"If scour from vessel movements during operation or impacts from maintenance activities (for example any maintenance dredging) are likely to result in significant effects on heritage assets, these should be assessed in the ES. The Inspectorate is otherwise content that physical effects on unknown buried heritage assets, including submerged remains, are not likely to result in significant effects during the operational phase and that this matter can be scoped out."*	Potential physical effects on unknown buried heritage assets within the Site have been considered in this PEIR and will be assessed in the ES. This includes the construction phase and the operation phase (for potential submerged remains within the Thames foreshore), as outlined in the first two rows of Table 8-2 in the EIA Scoping Report[17].
3.5.2	Potential indirect effects on unknown buried heritage assets within the Site (archaeological remains), including potential submerged remains within the Thames foreshore (marine) – construction phase.	*"Impacts on archaeological remains from dewatering and from the movement of contaminants or pollutants during construction (or operation), should be assessed where significant effects are likely. The Inspectorate is otherwise content that indirect effects on unknown buried heritage assets, including submerged remains, are not likely to result in significant effects during the construction phase and that this matter can be scoped out."*	Extensive dewatering works do not form part of the construction approach for the Proposed Scheme. If the evolving design changes such that the there is a likelihood for significant indirect effects on unknown buried heritage assets during the construction phase, these will be assessed in the ES. The ES will include cross-reference to Chapter 17: Ground Conditions and Soils, where relevant, ground remediation activities will be assessed.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.5.3	Potential temporary effects on designated above-ground heritage assets, which are located beyond the Site Boundary and within the Study Area – construction phase.	*"The Scoping Report (Table 8-2) proposes that this matter is scoped out on the basis that construction impacts would be short term (60 months), temporary and not considered significant. The Inspectorate is content that significant effects are not likely and that this matter can be scoped out."*	No response required.
3.5.4	Impacts to the setting of non-designated above ground heritage assets – construction and operational phases.	*"The Scoping Report explains that a single non-designated above ground heritage asset has been identified within a 500m Study Area, a locally listed building (an early 20th century concrete police box). The Scoping Report does not identify the specific location of this asset on a plan or explain its heritage significance but proposes that it is scoped out of the settings assessment "Due to its nature and location…". The Scoping Report therefore proposes that no non-designated above-ground heritage assets will be assessed, with no other such assets having been identified within the Study Area. Justification for use of a 500m Study Area has not been provided and whilst paragraph 8.8.2 of the Scoping Report lists the data sources that will be used to inform the description of baseline historic environment conditions in the Preliminary Environmental Information Report (PEIR) and ES, it is unclear what sources have been consulted at this stage to identify relevant non-designated above ground heritage*	Impacts to the setting of non-designated above ground heritage assets have been included in the assessment presented within this PEIR. As stated in Paragraph 8.4.2 of Chapter 8: Historic Environment of the EIA Scoping Report[17], a Study Area of 500m around the Site Boundary was applied for identifying non-designated above ground heritage assets beyond the Proposed Scheme. In accordance with best practice and NPPF Guidance[3] on proportionality, professional judgement has been applied to choose this Study Area, which is limited to locally listed assets only. The only locally listed building within 500m is the early 20th century concrete structure, similar in style to a

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		assets which may be impacted. Based on the limited information and justification provided, the Inspectorate is not in a position to scope out this matter. Impacts to the setting of non-designated above ground heritage assets should therefore be scoped into the ES where significant effects are likely to occur. The assessment of impacts to the setting of any non-designated above ground heritage assets should be supported by baseline data which is sufficient to identify all such assets which could be impacted by the Proposed Development. The ES should explain the approach to determining the significance of non-designated heritage assets. The ES should justify the choice of Study Area with reference to the refined Zone of Theoretical Visibility (ZTV) developed for the Townscape and Visual Impact Assessment (TVIA), which should be used to confirm whether any non-designated above ground heritage assets may experience visual impacts from the Proposed Development. The Applicant should make effort to discuss and agree any relevant non-designated above ground heritage assets for assessment with the relevant local planning authority/ies."	police box, which is located approximately 490m to the west of the Site. While the Proposed Scheme may be visible in the long view out from this asset towards the east, this view does not make a substantial contribution to the asset's significance. The Proposed Scheme would not affect the relationship of the asset to the surrounding industrial landscape. The Proposed Scheme is unlikely to result in a material change to the asset's setting or significance. As such the asset has been scoped out for further assessment. The PEIR Study Areas (described in **Section 9.5**) and impact assessment have been informed by a digital Zone of Theoretical Visibility (ZTV), produced as part of the Townscape and Visual Impact Assessment (TVIA) presented in **Chapter 10: Townscape and Visual Impact (Volume 1)**.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.5.5	Setting of non-designated above ground heritage assets not afforded protection in the Local Plan, which are located beyond the Site Boundary – construction and operational phases.	*"Table 8-2 (rows 5 and 6) of the Scoping Report states that the heritage significance of non-designated above-ground heritage assets outside of the Site Boundary that are not afforded protection within the Local Plan, is not considered high enough to warrant a settings assessment. However, the Scoping Report goes on to propose that "The assessment will therefore focus on the most sensitive receptors, designated by Historic England as being of significance". This introduces confusion around the proposed approach given that locally listed buildings and structures within a Local Plan are not designated by Historic England. The Inspectorate agrees that impacts to the setting of non-designated above-ground heritage assets not afforded protection in the Local Plan, which are located beyond the Site Boundary, are not likely to result in significant effects and can be scoped out. However, impacts on non-designated above ground heritage assets which are locally listed, should be assessed where significant affects are likely (as per the row above)."*	It is agreed that impacts to the setting of non-designated above ground heritage assets not afforded protection in the Bexley Local Plan[5], which are located beyond the Site Boundary, are not likely to result in significant effects and can be scoped out. The distinction between Historic England national designations and local listings has been clarified in this chapter (see **Section 9.4**). As stated above, the only locally listed building within 500m of the Site Boundary is the early 20th century concrete structure, similar in style to a police box, which is located approximately 490m to the west of the Site. The Proposed Scheme is unlikely to result in a material change to the asset's setting or significance. As such the asset has been scoped out for further assessment.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.5.6	Impacts to setting	*"The Scoping Report explains that the 2km TVIA Study Area (as presented in the Scoping Report) will be refined through ZTV modelling and site work. The refined ZTV should be used to confirm which heritage assets may experience visual impacts from the Proposed Development.* *The ES should fully justify the choice of heritage assets included in the setting assessment and their locations should be depicted on a supporting plan. The assessment should be supported by appropriate visualisations such as photomontages to help illustrate the likely impacts of the Proposed Development. Effort should be made to agree appropriate viewpoint locations for such visualisations with relevant consultation bodies including local authorities and Historic England. Cross reference can be made to the TVIA ES assessment to avoid duplication."*	The digital ZTV, produced as part of the TVIA presented in **Chapter 10: Townscape and Visual Impact (Volume 1)**, together with a site walkover and professional judgement, have been used to confirm which heritage assets may experience visual impacts from the Proposed Scheme. The application for development consent will be supported by photomontage and visualisations which will inform the impact assessment on heritage assets, where relevant.
3.5.7	Archaeological baseline	*"Paragraph 8.3.5 of the Scoping Report explains that the application site lies within the Thamesmead and Erith Marshes Archaeological Priority Area. The Inspectorate notes that Historic England (Appendix 2 of this Opinion) consider a detailed deposit modelling exercise will be necessary. It is unclear whether any intrusive field work is proposed to inform the baseline (in addition to any previously undertaken for Riverside 1 and Riverside 2). The Applicant should make effort*	The strategy for further survey and mitigation is set out in **Section 9.9**. The strategy will be agreed in consultation with GLAAS following publication of this PEIR.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		to discuss and agree the need for any intrusive investigations and trial trenching with relevant consultation bodies, along with details of the timing, scope and methodology of any such works. Where necessary, any intrusive investigations and trial trenching should be completed prior to submission of the DCO application."	
Historic England			
Table 8-2	N/A	*"Given the location, scale of the proposed work, it is recommended that archaeology is scoped-in."*	Archaeological remains have been included in both the construction and operation phase assessments presented within this PEIR. These assessments will be reviewed and updated, where necessary, as part of the ES.
8.2	N/A	*"Legislation, Policy and Guidance section should make reference to borough wide SPD: Archaeological Priority Areas Appraisal, Jan 2020."*	This policy has been included in **Table 9-1**.
8.2	N/A	*"Reference should also be made to the Bexley Riverside Opportunity Area as noted in the London Plan 2021."*	This policy has been included in **Table 9-1**.
8.3	N/A	*"8.3.8 identifies the potential risk to the archaeological resource from the effects in the area of the foreshore… this statement is supported."*	No response required.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
8.6	N/A	*"The scope of the design, mitigation and enhancement measures was supported."*	No response required.
8.7	N/A	*"The description of potential likely significant effects was supported."*	No response required.
Table 8-2	N/A	*"Support of the elements proposed to be scoped-in and scoped out."*	No response required.
N/A	N/A	*"In respect of assessing impact and effects, a detailed deposit modelling exercise was recommended, referring to Deposit Modelling and Archaeology: Guidance for Mapping Buried Deposits."*	Deposit modelling is included as an additional design, mitigation and enhancement measure within **Section 9.9**.
London Borough of Bexley			
Table 8-1	N/A	*"Table 8-1 of the Scoping Opinion outlines a summary of key legislation, policy and guidance. This section should reference the Tier 3 Area of Archaeological Potential (Thamesmead and Erith Marshes), as identified in the London borough of Bexley Archaeological Areas Appraisal (prepared by Historic England, January 2020)."*	This policy has been included in **Table 9-1**.
Table 8-1	N/A	*"The Crossness Conservation Area Appraisal and Management Plan does not appear to be referenced. As the conservation area is a designated heritage asset, this document should be acknowledged and addressed."*	The Conservation Area Appraisal and Management Plan[21] for the Crossness Conservation Area is included within the baseline section of this technical chapter, **Section 9.6**.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Table 8-1	N/A	*"With regards to the Local Plan policies, Policy SP1- Achieving Sustainable Development – the spatial strategy covers all new proposals for development under part 2 of the policy. This policy should be referenced within the ES."*	The Local Plan is included in **Table 9-1**. Policy SP1 relates to sustainable development and is therefore not considered relevant to the historic environment. Policy SP1 is referenced within **Chapter 10: Townscape and Visual Impact (Volume I)**.
Table 8-1	N/A	*"The setting of heritage assets is referenced within the chapter; however, Table 8-1 of the Scoping Opinion does not mention the key Legislation of the Planning (Listed Buildings and Conservation Areas) Act 1990. Sections 66 and 72 are directly relevant to the assessment of the impact of any development upon the setting of Listed Buildings and Conservation Areas."*	The Planning (Listed Buildings and Conservation Areas) Act 1990 is included in **Table 9-1** of this chapter.
Table 8-2	N/A	*"Table 8-2 of the Scoping Opinion outlines the impacts which will be scoped in or out of further assessment. It is considered (based on Legislation requirements, and existing policy and guidance) that the conclusions for further assessment are appropriate."*	No response required.

9.3.2. **Table 9-3** provides a summary of the consultation and engagement undertaken to inform the historic environment assessment to date.

Table 9-3: Historic Environment – Consultation and Engagement Summary

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
21st September 2023, Email	GLAAS	GLAAS generally supported the mitigation strategy proposed by WSP. Regarding deposit modelling, GLAAS stated that this will need to be related to the proposed pile and pile cap plan and possible remediation areas to inform which parts of the Site will require further consideration. GLAAS require the foreshore survey to commence prior to the construction phase. Subsequent foreshore surveys will be required during the construction phase and up to six months after its completion. GLAAS stated that the impact from temporary works will also need to be considered, including those associated with anchor chains. It is likely that a DCO requirement will need to be agreed for community engagement.

9.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

9.4.1. The historic environment assessment of the Proposed Scheme has been undertaken in line with the legislation, policy and guidance described in **Section 9.2** of this chapter.

POTENTIAL SIGNIFICANT EFFECTS

9.4.2. As identified in the EIA Scoping Report[16] and subsequently, the effects arising from the following aspects of the Proposed Scheme are considered to be significant and therefore have been considered further in this assessment:

- Construction Phase:
  - Potential physical effects on unknown buried heritage assets within the Site Boundary (archaeological remains), including potential submerged remains within the Thames foreshore (marine).
  - Demolition of non-designated above ground heritage assets within the Site Boundary during the construction phase (i.e., the Belvedere Power Station Jetty (disused), if removed as part of the Proposed Scheme).

- Operation Phase:
  - Potential indirect effects on unknown buried heritage assets within the Site Boundary (archaeological remains), including potential submerged remains within the Thames foreshore (marine).
  - Potential permanent effects on designated above-ground heritage assets located beyond the Site Boundary and within the Study Area through changes to setting.

MATTERS SCOPED OUT

9.4.3. The following effects are considered unlikely to be significant and therefore have not been considered further in this assessment:

- Construction Phase:
  - Potential temporary, construction phase effects on designated above-ground heritage assets located beyond the Site Boundary and within the Study Area.
  - Setting of non-designated above-ground heritage assets not afforded protection in the Local Plan located beyond the Site Boundary.
- Operation Phase:
  - Setting of non-designated above-ground heritage assets not afforded protection in the Local Plan located beyond the Site Boundary.

SENSITIVE RECEPTORS

9.4.4. The Site does not contain any statutorily designated (protected) heritage assets, such as scheduled monuments, listed buildings or registered parks and gardens. The Site does not lie within a conservation area. No locally listed buildings are situated within the Site Boundary.

9.4.5. Known and predicted sensitive receptors are set out in **Section 9.6** (baseline conditions). Broadly, historic environment receptors relevant to the Proposed Scheme comprise of the following Study Areas:

- designated above ground heritage assets within 1km of the Site Boundary;
- locally listed above ground heritage assets within 500m of the Site Boundary;
- non-designated above ground heritage assets within the Site; and
- previously unrecorded non-designated below-ground heritage assets (archaeological remains) within the Site (including within the marine/intertidal zone).

9.4.6. Further information and context on the Study Areas is provided in **Section 9.5**.

BASELINE DATA COLLECTION

9.4.7. The key sources of information used for characterising the baseline for the historic environment are:

- National Heritage List for England (NHLE) for information on statutorily designated heritage assets, including scheduled monuments, listed buildings and protected wrecks. The Heritage at Risk register has also been consulted.
- Historic England guidance on decision-taking in the historic environment and for information on APA[18].
- Greater London Historic Environment Record (GLHER) data for information on past investigations, local knowledge, find spots and documentary and cartographic sources.
- National Marine Heritage Record (NMHR) search for information on heritage assets that lie between Mean High Water (MHW) and the 200 nautical mile sea limit, as well as the tidal extent (at MHW spring tides) of rivers, estuaries and creeks.
- United Kingdom Hydrographic Office (UKHO) marine wrecks and obstructions search for the foreshore to identify possible heritage assets, such as hulked marine vessels, within the proposed land reclamation areas.
- London Borough of Bexley's information on APA, conservation areas and locally listed buildings.
- Bexley Local Studies and Archive Centre for historic maps, published journals and local history.
- British Geological Survey (BGS) for geological data.
- Portable Antiquities Scheme (PAS) for information on archaeological finds found by chance.
- Historic Ordnance Survey maps.
- The internet for web-published local history and the Archaeological Data Service.
- Previous assessments of the Site for information on its archaeological potential, including existing baseline reports for Riverside 1 and Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken).

Site Walkover

9.4.8. The collection of information to inform the baseline for the assessment also included a walkover to determine the topography of the Site and existing land use, and to provide further information on areas of possible past ground disturbance and general historic environment potential. The walkover extended to selected designated heritage assets located beyond the Site Boundary, based on the digital ZTV and professional judgement, to consider potential impacts to them and their setting (e.g. visible changes to historic character and views). The walkover was undertaken on the 3rd of March 2023.

9.4.9. Due to its location on a private road the Grade II listed No. 4 Jetty and Approach at Dagenham Dock could not be accessed during the walkover. The Grade II listed No. 4 Jetty and Approach at Dagenham Dock is situated approximately 750m to the northwest of the Site Boundary. As a result, photographs of this heritage asset could only be taken from the opposite side of the River Thames. The view from this asset towards the Site could not be photographed.

9.4.10. The internal areas of Crossness Sewage Treatment Works were not accessed during the walkover as it is not required to assess the contribution of setting to baseline heritage value. The locally listed 'police box' style concrete structures located here were also not accessed.

9.4.11. Further information on these heritage assets and others is available in **Section 9.6**.

ASSESSMENT METHODOLOGY

9.4.12. Following the characterisation of baseline conditions, the methodology used to characterise the potential likely significant environmental effects on above ground heritage assets and potential buried and submerged heritage assets comprises:

- evaluating the heritage significance (value) of assets, based on existing designations and professional judgment where such resources have no formal designation;
- evaluating the contribution that setting makes to the overall heritage significance (value) of above ground heritage assets selected for assessment;
- predicting the magnitude of change upon the known or potential heritage significance (value) of assets and the likelihood and resulting significance of environmental effect;
- considering the mitigation measures that have been included within the Proposed Scheme and any additional mitigation that might be required to avoid, reduce or off-set any significant adverse effects; and
- quantifying any residual effects (those that might remain after mitigation).

SIGNIFICANCE CRITERIA

Value of Heritage Asset

9.4.13. For the purposes of this report, heritage ‘significance’, as defined in the NPS EN-1 (2011)[1] and the NPPS, is referred to as ‘value’ hereafter.

9.4.14. NPS EN-1 (2011[1], paragraph 5.8.2) defines heritage assets as those elements of the historic environment that hold value to this and future generations because of their historic, archaeological, architectural or artistic interest. Value derives not only from a heritage asset’s physical presence, but also from its setting.

9.4.15. Each asset is evaluated against the range of these criteria on a case-by-case basis. Unless the nature and exact extent of buried and submerged archaeological remains within any given area has been determined through prior investigation, heritage value is often uncertain.

9.4.16. In relation to heritage assets, the assessment considers the contribution that the historic character and setting makes to the overall heritage value of the asset.

9.4.17. **Table 9-4** below gives examples of the value of designated and non-designated heritage assets.

Table 9-4: Value of Heritage Assets

Significance (Value)	Heritage Asset Description
Very High	• World Heritage Sites.
High	• Scheduled Monuments. • Grade I Listed Buildings. • Grade II* Listed Buildings • Grade II Listed Buildings (with exceptional qualities in fabric, historical association, and/or association/group value with heritage assets of high value). • Protected Wrecks. • Registered Battlefield. • Conservation Areas (containing very important Listed Buildings (Grade I / II*)). • Grade I and II* Registered Parks and Gardens. • Protected Heritage Landscapes (e.g., ancient woodland or historic hedgerows, heritage Sites of Special Scientific Interest). • Burial Grounds. • Non-designated Heritage Assets ((above ground structures, landscape, townscape, buried and submerged remains, including hulked marine vessels) of national importance).
Medium	• Grade II Listed Buildings (which can be shown to have qualities in their fabric or historical association of regional importance only). • Conservation Areas (containing primarily Grade II listed or Locally Listed Buildings). • Grade II Registered Parks and Gardens. • Locally Listed Buildings (of exceptional quality). • Non-designated Heritage Assets ((above ground structures, landscape, townscape, buried and submerged remains, including hulked marine vessels) of regional importance).

Significance (Value)	Heritage Asset Description
Low	• Non-designated Heritage Assets ((above ground structures, landscape, townscape, buried and submerged remains, including hulked marine vessels) of local importance); and • Locally Listed Buildings.
Negligible	• Item with no significant heritage value or interest.
Uncertain	• Heritage assets that have a clear potential, but for which current knowledge is insufficient to allow value to be determined.

Magnitude of Change

9.4.18. The determination of magnitude of change upon the heritage value of known or potential heritage assets is based on the severity of the likely impact, such as physical impacts on built heritage assets, or the permanent presence of new structures that result in impacts to the setting of heritage assets.

9.4.19. **Table 9-5** below presents the criteria to be used in this assessment to determine the magnitude of change.

Table 9-5: Historic Environment Magnitude of Change

Magnitude of Change	Description of Change
High	• Complete removal of asset. • Change to asset value resulting in a fundamental change in our ability to understand and appreciate the resource and its historical context, character and setting. • The transformation of an asset's setting in a way that fundamentally compromises its ability to be understood or appreciated. • The scale of change would be such that it could result in a designated asset being undesignated or having its level of designation lowered.
Medium	• Change to asset value resulting in an appreciable change in our ability to understand and appreciate the asset and its historical context, character and setting. • Notable alterations to the setting of an asset that affect our appreciation of it and its value; or the unrecorded loss of archaeological interest.

Magnitude of Change	Description of Change
Low	• Change to asset value resulting in a small change in our ability to understand and appreciate the asset and its historical context, character and setting.
Negligible	• Negligible change or no material change to asset value. • No real change in our ability to understand and appreciate the asset and its historical context, character and setting.
Uncertain	• Level of survival / condition of resource in specific locations is not known magnitude of change is therefore not known.
No Change	• No change to asset value.

Significance Criteria

9.4.20. The assessment of potential likely significant effects considers both the construction and operation phases of the Proposed Scheme. The significance level of each effect has been assessed based on the heritage value of the affected sensitive receptor (heritage asset) and the magnitude of change (impact) to the heritage value of the receptor due to the Proposed Scheme (outlined in **Table 9-6** below). The significance of effect terminology used in **Table 9-6** is consistent with the matrix for Determining Significance of Effect shown in **Chapter 4: EIA Methodology (Volume 1).** However, heritage 'value' is used in place for 'sensitivity' in this technical chapter.

9.4.21. Effects may be either 'adverse' or 'beneficial' and are defined initially without additional mitigation; residual effects are then identified following the application of any appropriate additional mitigation. This table is a guide only, so that the process is transparent; the rationale for the effect scores is provided in the relevant sections. Where the resulting effect comprises two separate levels (i.e., 'moderate or minor' or 'minor or negligible') professional judgement has been applied to select the most appropriate significance of effect.

9.4.22. Where information is insufficient to be able to quantify either the asset value or magnitude of change with any degree of certainty, the effect is given as 'uncertain'. This might be the case for possible buried and submerged heritage assets, the presence, nature, date, extent and value of which is uncertain due to the absence of any site-based investigation.

Table 9-6: Significance of Historic Environment Effect

		Heritage Asset (Receptor) Heritage Value					
		Very High	High	Medium	Low	Negligible	Uncertain
Magnitude of Change (Impact)	High	Major	Major	Major or Moderate	Moderate or Minor	Negligible	Uncertain
	Medium	Major or Moderate	Major or Moderate	Major or Moderate	Minor	Negligible	Uncertain
	Low	Moderate or Minor	Moderate or Minor	Minor	Minor	Negligible	Uncertain
	Negligible	Minor or Negligible	Minor or Negligible	Negligible	Negligible	Negligible	Uncertain
	Uncertain	Uncertain	Uncertain	Uncertain	Uncertain	Uncertain	Uncertain

9.4.23. The following terms have been used to define the significance of the effects identified:

- **Major Effect** – where the Proposed Scheme could be expected to have a considerable effect (either beneficial or adverse) on a heritage asset (receptor). For the historic environment, within NPS EN-1 (2011)[1] and NPPF 2023[19], this generally equates to substantial harm to, or loss of, heritage value of an asset of very high, high or medium value, as a result of changes to its physical form or setting.
- **Moderate Effect** – where the Proposed Scheme could be expected to have a noticeable effect (either beneficial or adverse) on a heritage asset (receptor). For the historic environment this generally equates to less than substantial harm to the heritage value of an asset of very high, high or medium value, as a result of changes to its physical form or setting.
- **Minor Effect** – where the Proposed Scheme could be expected to result in a small, barely noticeable effect (either beneficial or adverse) on a heritage asset (receptor). For the historic environment this generally equates to less than substantial harm to the heritage value of an asset of very high, high or medium value, as a result of changes to its physical form or setting, or substantial harm to, or the loss of, heritage value of an asset of low value.
- **Negligible** – where no discernible effect is expected as a result of the Proposed Scheme on heritage assets.

9.4.24. A Historic Environment Desk Based Assessment (HEBDA) will be appended to the ES. This will include an assessment of harm in accordance with NPS EN-1 (2011)[1] and NPPF 2023[19].

9.4.25. Effects classified as moderate or above are considered to be 'significant'. Effects classified as minor or below are considered to be 'not significant'.

9.5. STUDY AREA

9.5.1. In order to determine the full historic environment potential within the Site, a broad range of standard documentary and cartographic sources, including results from any archaeological investigations within 1km of the Site Boundary, have been examined to determine the likely nature, extent, preservation and value of any known or possible buried and submerged heritage assets that may be present within, or adjacent to, the Site, including the foreshore and marine areas. Where appropriate, reference has been made to key heritage assets beyond the Study Areas.

9.5.2. The Study Areas for the above ground heritage asset settings assessment comprise:

- Designated above ground heritage assets up to 1km from the Site Boundary. This Study Area has been informed by a digital ZTV which indicates likely visibility of the Proposed Scheme within the surrounding area. Professional judgement has been applied when scoping designated heritage assets potentially affected through changes to setting and, where relevant, assets beyond the 1km Study Area may be considered. This is to ensure that the setting of designated heritage assets is taken into consideration. Details of the proposed digital ZTV are outlined in **Chapter 10: Townscape and Visual (Volume 1)**.
- Non-designated above ground heritage assets up to 500m from the Site Boundary, specifically locally listed buildings. The nearest non-designated above ground heritage asset is an early 20th century concrete structure, similar in style to a police box, approximately 490m to the west of the Site Boundary, which is a locally listed building. Due to its nature and location, this asset has been scoped out of the settings assessment, as per the EIA Scoping Report[16].

9.5.3. The 1km and 500m Study Areas are shown in **Figure 9-1: Historic Environment Study Area (Volume 2)**.

9.6. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

9.6.1. The detailed baseline, chronological background and historic mapping is set out in **Appendix 9-1**: **Historic Environment Baseline Report (Volume 3)**. Heritage assets scoped out from further assessment are also discussed in **Appendix 9-1: Historic Environment Baseline Report (Volume 3)** for context.

9.6.2. A statement of value is outlined in the section below in the context of the baseline. A summary of the value of each heritage asset is presented in **Section 9.8**.

9.6.3. This section also includes details of the degree to which setting makes a contribution to the heritage value of above ground heritage assets, in line with Historic England's 2017 guidance on settings assessment[11].

9.6.4. Above ground heritage assets are referenced by their unique asset number (e.g. A1, A2 etc) as shown on **Figure 9-2: Historic Environment Features Map (Volume 2)** which shows their location in relation to the Site.

Above Ground Heritage Assets

Belvedere Power Station Jetty (disused)

9.6.5. There is one above ground heritage asset within the Site. This is the Belvedere Power Station Jetty (disused) (**A1g**), which is a non-designated heritage asset. This asset is not locally listed.

9.6.6. The Belvedere Power Station Jetty (disused) in the northeast of the Site first appears on the 1966-69 6": mile Ordnance Survey map and was a fuelling jetty likely constructed between 1954 and 1960 at the same time as the rest of the power station to the immediate east of the Site. This Jetty is disused at the time of writing and maybe demolished or retained as part of the Proposed Scheme, as described in **Chapter 2: Site and Proposed Scheme Description (Volume 1),** this will be assessed and confirmed in the ES.

9.6.7. The value of the Belvedere Power Station Jetty (disused) is derived from its historic interest as the last surviving element of the former Belvedere Power Station. It is a good example of a post-war industrial jetty, constructed of both concrete and timber. A two-storey brick-built structure sits on the centre of the Belvedere Power Station Jetty and a metal loading bridge with concrete supports connects it to the land. Two octagonal plan concrete and timber dolphins are situated off both ends of the Jetty. The Ordnance Survey 1:1,250 scale map of 1963-64 shows that the dolphins were used to house navigation lights. Cranes and bollards are also labelled on the Belvedere Power Station Jetty (disused) on this map.

9.6.8. As a non-designated heritage asset of local importance, this Jetty is an asset of **low** value.

9.6.9. The Belvedere Power Station Jetty is defined and experienced by its industrial location and its visual and functional relationship with the River Thames. The Jetty is located on the southern foreshore of the River Thames, where it is visible from the north foreshore and the England Coast Path along the south bank. Although its historic setting has been diminished by the demolition of the associated Belvedere Power Station, this Jetty retains its relationship with the River Thames and the surrounding industrial landscape. The setting of the Belvedere Power Station Jetty makes a medium contribution to the asset's value.

Crossness Pumping Station

9.6.10. There are four separate designated heritage assets at Crossness Sewage Treatment Works, the closest of which is located approximately 900m to the west of the Site, comprising three listed buildings (**A2-4**) and the Crossness Conservation Area (**A6**). At Crossness Sewage Treatment Works, the sewage was pumped into the River Thames just after high tide and carried out into the North Sea. A large underground reservoir was constructed so the sewage could be stored until high tide. The Crossness Sewage Treatment Works were designed by Sir Joseph Bazalgette, the chief engineer of London's Metropolitan Board of Works, and architect Charles Henry Driver, in the 1860s in an attempt to solve London's sanitation problem. Bazalgette was also responsible for the sewage works on the north side of the River Thames at Barking.

9.6.11. Originally the Crossness Sewage Treatment Works comprised the Grade I listed Victorian Romanesque style engine house and 6.5 acres of storage tanks. Other buildings at the works included workshops, outbuildings and houses for the workmen. A 63m tall chimney, in the form of a campanile, formerly stood within the Crossness Sewage Treatment Works. Sedimentation channels were introduced in 1887 to separate the solid sludge from the liquid effluent. Only the latter was discharged into the Thames thereafter. The modern sewage treatment plant began operation in 1963, making use of large reinforced concrete primary sludge digestion tanks[20].

Workshop Range to South East of Main Engine House (A2)

9.6.12. The Workshop Range to south east of main engine house at Crossness Pumping Station (**A2**) dates to the 1860s and was built by William Webster to the designs of Sir Joseph Bazalgette and Charles Henry Driver. The building is constructed of yellow brick in a Flemish bond.

9.6.13. The asset has historic and architectural interest as a component part of a Victorian pumping station, designed to improve the disposal of sewage required by the ever-growing population of London. Its historic interest is enhanced by its connection to Bazalgette. It was listed at Grade II in 1990 (NHLE ref: 1064216). As a Grade II listed building it is a heritage asset of **medium** value, although it is associated with a Grade I listed building as described below (**A3**).

Crossness Pumping Station (A3)

9.6.14. Crossness Pumping Station (**A3**) dates to 1865 and was built to the designs of Sir Joseph Bazalgette. The building is of two storeys and constructed of yellow brick. It contains four beam engines by James Watt and Co, which were converted from single to twin cylinders in 1909-10[20]. The asset has high historic and architectural interest as an outstanding example of a Victorian pumping station, designed to improve the disposal of sewage and meet the needs of the ever-growing population of London. Its historic interest is enhanced by its connection to Bazalgette. It was listed at Grade I in 1970 (NHLE ref: 1064241). As a Grade I listed building it is a heritage asset of **high** value.

Workshop Range to South West of Main Engine House (A4)

9.6.15. Workshop Range to South West of main engine house at Crossness Pumping Station (**A4**) is a Grade II listed building dating to the 1860s and was built by William Webster to the designs of Sir Joseph Bazalgette and Charles Henry Driver. The building is constructed of yellow brick in a Flemish bond.

9.6.16. The asset has historic and architectural interest as a component part of a Victorian pumping station, designed to improve the disposal of sewage required by the ever-growing population of London. Its historic interest is enhanced by its connection to Bazalgette. It was listed at Grade II in 1990 (NHLE ref: 1250557). As a Grade II listed building it is a heritage asset of **medium** value, although it is associated with a Grade I listed building as described above (A3).

Crossness Conservation Area (A6)

9.6.17. Crossness Conservation Area (**A6**) incorporates the Crossness Pumping Station heritage assets described above. Other heritage assets within the Conservation Area include the brick vaulted subterranean reservoir, the storm water pumping station, the centrifugal engine house and the precipitation engine house. The Conservation Area was designated in 1997 and is described by LBB as *"South East London's most important site for industrial archaeology"*[21].

9.6.18. The setting of the Crossness Conservation Area is defined by its relationship to the listed buildings at Crossness Sewage Works and by the relationship of these buildings to each other. The setting of the asset is also defined by its location on the Thames riverside and the surrounding remnants of the original rural landscape. The most significant views are outlined in the Conservation Area Appraisal and Management Plan, including those from the River Thames and the ECP/NCN1 towards the listed buildings; the view from Crossness Pumping Station to the south; the view from the open space to the west towards the conservation area; and the view to the northeast along the entrance driveway towards the listed buildings. However, the concrete river flood defence wall (which stands 2.5 – 3m OD) to the north of the listed buildings obscures historic views of the River Thames. As stated in the Conservation Area Appraisal and Management Plan[21], this wall has *"partially severed"* the link between the buildings and the River Thames. Therefore, taken overall, the asset's setting makes a medium contribution to its value.

No. 4 Jetty and Approach

9.6.19. No. 4 Jetty and Approach (**A5**), formerly at Samuel Williams and Company, Dagenham Dock, was constructed between 1899 and 1903 to designs by L.G. Mouchel & Partners and extended in 1906-07. No. 4 Jetty, which is situated approximately 750m to the northwest of the Site Boundary, has historic interest as being among Britain's earliest surviving reinforced-concrete structures that uses Samuel Williams' patented system for the horizontal casting of reinforced-concrete piles. It was listed at Grade II in 2006 (NHLE ref: 1391706). As a Grade II listed building it is a heritage asset of **medium** value.

9.6.20. The setting of No. 4 Jetty and Approach (**A5**) is experienced by its industrial location at Dagenham Dock on the north bank of the River Thames. The asset is defined by its relationship to the wider group of jetties, warehouses and other industrial buildings at Dagenham Dock. The setting of No. 4 Jetty makes a medium contribution to its value, as it retains its historical relationship to the River Thames to the south and the industrial landscape of Dagenham Dock to the north.

Below Ground Heritage Assets (Archaeological Remains)

9.6.21. **Table 9-7** below lists the known or predicted buried heritage assets (sensitive receptors) that have been identified as having the potential for significant effects. The table includes those assets with unknown, moderate and high potential to be present within the Site. Archaeological remains that are not predicted to be present (i.e., low potential) are not included in **Table 9-7** and have not been assessed further, as described in **Section 9.4**.

Table 9-7: Known or Predicted Heritage Assets and Likely Value

Known or Predicted Buried Heritage Asset (sensitive receptor)		Value
Palaeoenvironmental Remains	There is a known, high potential for palaeoenvironmental remains to survive within the Site based on previous investigations within the Site and surrounding area. It is likely that any environmental evidence within the lower part of the deposit sequence (e.g., within peat and the lower clay) would remain intact due to their depth. Alluvium (clay/silt) and peat deposits may contain well-preserved environmental remains. Minerogenic deposits such as alluvial silts and clays have potential for the preservation of diatoms, ostracods and molluscs, the assessment of which can provide information on the salt or freshwater nature of deposits. Peat deposits preserve pollen, seeds and plant fragments, and can also be dated by radiocarbon techniques, important for establishing the chronology for the depositional sequence. It is likely that environmental evidence is present within Holocene alluvium.	The value of Palaeoenvironmental remains would depend on their nature and extent but would be **low** or **medium.** Such remains have evidential value for the past environment in which prehistoric and later people lived with heritage value deriving from archaeological interest.

Known or Predicted Buried Heritage Asset (sensitive receptor)		Value
Previously Unrecorded Prehistoric and Roman Remains	There is a low to moderate potential for prehistoric and Roman remains. During the prehistoric through to the early Roman period the Site would have been unsuitable for permanent occupation. However, it is possible it was used for subsistence activities as the riverside location would have provided opportunities for the exploitation of natural resources though exploitation. Typically remains are found in areas of higher ground or along the edges of river channels. In all likelihood, prehistoric or Roman remains would take the form of isolated find spots (flint tools and artefacts such as pottery sherds), as recorded on nearby sites (moderate potential).	Isolated findspots of flint tools or other artefacts would be of **low** or **medium** value (based on their limited archaeological interest).
Previously Unrecorded Post-Medieval and Modern Remains	Based on historic mapping and documentary evidence there is a high potential for post-medieval and modern remains to survive within the Site. It is likely that such remains would be limited to field boundaries or drainage ditches used to consolidate the former marshland. Surviving remains of former industrial buildings would likely be limited to wall footings and padding due to removal by modern development and site stripping (moderate potential).	Post-medieval remains would be of likely **low** value (based on their limited archaeological and historical interest). Modern remains would be of **negligible** or **low** value (depending on nature and extent and derived from archaeological and historic interest).
Possible marine obstructions (from all periods, including the remains of wrecks, former jetties and barge beds)	There is an uncertain potential for such remains of medieval or earlier date to survive within the Site, although there is a low to moderate potential for post-medieval and modern remains based on recorded obstructions within and around the Site.	The value of such remains would depend on their nature and extent, but in all likelihood would be **low** or potentially **medium** (derived from their archaeological and historical interest).

FUTURE BASELINE

9.6.22. For the terrestrial part of the Site, the future baseline is expected to remain the same as the current baseline because it is a stable resource that will not change or deteriorate.

9.6.23. In terms of the intertidal foreshore area of the Site, ongoing erosion or deposition from the River Thames may affect the future archaeological baseline (e.g., deposits of archaeological interest on the foreshore might be eroded out by natural fluvial erosion/scour and waves caused by the passing of shipping). This will be considered in more detail during the future stages of the EIA and presented in the ES.

9.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

9.7.1. This section sets out the embedded design, mitigation and enhancement measures relevant to the historic environment assessment.

CONSTRUCTION PHASE

9.7.2. Potential temporary, construction phase effects on designated above-ground heritage assets located beyond the Site Boundary and within the Study Area are scoped out, as a significant impact is unlikely (see **Section 9.4**). As such, no embedded mitigation or enhancement measures in relation to built heritage setting are proposed during the construction phase.

9.7.3. There are no embedded design, mitigation or enhancement measures proposed in response to potential construction phase effects on archaeological remains.

9.7.4. Design adjustments to the piling layout are not considered necessary in response to the likely effects as these would be appropriately delivered as an additional mitigation measure (described in **Section 9.9**).

OPERATION PHASE

9.7.5. At this stage, no embedded design, mitigation or enhancement measures in relation to built heritage setting and archaeological remains are proposed during the operation phase.

9.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

9.8.1. This section details the preliminary assessment of impacts and effects on the historic environment arising from the Proposed Scheme during both its construction and operation phases.

CONSTRUCTION PHASE

Potential Physical Effects on Unknown Buried Heritage Assets within the Site (archaeological remains), including Potential Submerged Remains within the Thames Foreshore (marine)

Palaeoenvironmental Remains

9.8.2. For the assessment of effects on known palaeoenvironmental remains, the heritage value of the asset is **low** or **medium,** based on the archaeological interest of topographical/environmental information. The magnitude of change is **medium** deriving from the insertion of piled foundations. Therefore, there is likely to be a direct, permanent, long term, **moderate adverse** effect on palaeoenvironmental remains (**significant**).

Potential Prehistoric and Roman Remains

9.8.3. For the assessment of effects on potential prehistoric and Roman remains comprising localised artefacts (e.g., flint tools or artefacts), the heritage value of such remains is likely **low** or **medium** based on the limited archaeological interest of the finds. The magnitude of change is **medium** deriving from the insertion of piled foundations within the terrestrial zone. Therefore, there is likely to be a direct, permanent, long term, **minor adverse** effect on prehistoric remains (**not significant**).

Unrecorded Post-medieval and Modern Remains

9.8.4. For the assessment of effects on known unrecorded post-medieval and modern remains, the heritage value of the asset is **low** based on the limited archaeological and historic interest of the remains. If such remains are present within the Site, the magnitude of change is potentially **medium** deriving from the insertion of piled foundations. Therefore, there is likely to be a direct, permanent, long term, **minor adverse** effect on post-medieval and modern remains (**not significant**).

Post-medieval and Modern Marine Obstructions

9.8.5. For the assessment of effects on post-medieval and modern marine obstructions, the heritage value of the assets is **low** or **medium,** based on the limited archaeological and historic interest. If such remains are present within the Site, the magnitude of change is potentially **high** deriving from the proposed capital dredge and piled foundations for the Proposed Jetty. Therefore, there is likely to be a direct, permanent, long term, **moderate adverse** effect on post medieval and modern marine obstructions remains (**significant**).

Demolition of Non-designated Above Ground Heritage Assets within the Site during the Construction Phase

9.8.6. For the assessment of effects on the Belvedere Power Station Jetty (disused), the heritage value of the non-designated heritage asset is **low,** based on the asset's historic, archaeological and architectural interest. As stated above, the magnitude of change for demolition of the decommissioned Belvedere Power Station Jetty (disused) has been assessed as **high**. The Proposed Scheme would likely result in the total demolition of the jetty resulting in a total loss of heritage value. Therefore, there is likely to be a direct, permanent, long term, **moderate adverse** effect on the Belvedere Power Station Jetty (disused) (**significant**).

9.8.7. In the event that the Belvedere Power Station Jetty (disused) is retained there would be no effect on this non-designated heritage asset. In this case, a settings assessment would be undertaken for this asset and presented within the ES.

OPERATION PHASE

Potential Indirect Effects on Unknown Buried Heritage Assets within the Site (archaeological remains), including Potential Submerged Remains within the Thames Foreshore (marine)

9.8.8. This preliminary assessment has considered the potential impact resulting from scour during the operation phase (see **Chapter 11: Water Environment and Flood Risk (Volume 1)**). The magnitude of change is potentially **medium** if extensive and affecting areas not previously disturbed by the preceding capital dredge.

Palaeoenvironmental Remains

9.8.9. For the assessment of effects on known palaeoenvironmental remains, the heritage value of the asset is **low** or **medium**, based on the archaeological interest of topographical/environmental information. The magnitude of change is uncertain, but potentially **medium**. Therefore, there is likely to be a direct, permanent, long term, **moderate adverse** effect on Palaeoenvironmental remains (**significant**).

Potential Submerged Remains

9.8.10. For the assessment of effects on possible marine obstructions from all periods, including the remains of wrecks, former jetties and barge beds, the heritage value is **low** or **medium**, based on the limited archaeological and historic interest. The magnitude of change as a result of maintenance dredging and scour is uncertain, but potentially **medium**. Therefore, there is likely to be an indirect, permanent, long term, **moderate adverse** effect on possible marine obstructions from all periods (**significant**).

Potential Permanent Effects on designated Above Ground Heritage Assets Located Beyond the Site Boundary and within the Study Area Through Changes To Setting

9.8.11. The disposal method of dredged arisings is not yet known, although the material may be reused in the construction process (see **Chapter 16: Materials and Waste (Volume 1)**). In the event that permanent stockpiles on land are proposed following the completion of the construction phase, the potential setting impacts on above ground heritage assets will be assessed in the ES.

Crossness Pumping Station

Workshop Range to South East of Main Engine House (A2)

9.8.12. The Workshop Range to south east of main engine house (**A2**) is located approximately 870m to the west of the Site Boundary. As a Grade II listed building, the Workshop Range to south east of main engine house Crossness Pumping Station is a heritage asset of **medium** value, deriving from architectural and historic interest.

9.8.13. Parts of the Proposed Scheme, including the Absorber Stack and the Proposed Jetty, would be visible in the long views out from the asset towards the east. This view, which is interrupted by intervening industrial buildings and chimney stacks, does not make a significant contribution to the asset's value. The digital ZTV shows that, at ground level, the Absorber Stack would be visible when glimpsed in views between the structures. Whilst it would not be visually prominent the Absorber Stack and the wider Carbon Capture Facility would still constitute new built form in the wider landscape.

9.8.14. For the assessment of effects on Workshop Range to south east of main engine house Crossness Pumping Station, the heritage value of the Grade II listed building is **medium**. The magnitude of change is **low**. Therefore, there is likely to be a direct, permanent **minor adverse** effect on Workshop Range to south east of main engine house Crossness Pumping Station (**not significant**).

Crossness Pumping Station (A3)

9.8.15. Crossness Pumping Station (**A3**) is located approximately 920m to the west of the Site Boundary. As a Grade I listed building, Crossness Pumping Station is a heritage asset of **high** value, deriving from architectural and historic interest.

9.8.16. Parts of the Proposed Scheme, including the Absorber Stack and the Proposed Jetty, would be visible in the long views out from the asset towards the east. This view, which is interrupted by intervening industrial buildings and chimney stacks, does not contribute to the asset's value. The digital ZTV prepared also shows that the tallest feature of the Proposed Scheme, Absorber Stack, which would be a maximum of 113m in height, would not be visually intrusive in views out from the asset at ground level towards the Site.

9.8.17. For the assessment of effects on Crossness Pumping Station, the heritage value of the Grade I listed building is **high**. The magnitude of change is **low**. Therefore, there is likely to be a direct, permanent, **minor adverse** effect on Crossness Pumping Station (**not significant**).

Workshop Range to South West of Main Engine House (A4)

9.8.18. The Workshop Range to south west of main engine house Crossness Pumping Station (**A4**) is located 990m to the west of the Site Boundary. As a Grade II listed building, Workshop Range to south west of main engine house Crossness Pumping Station is a heritage asset of **medium** value, deriving from architectural and historic interest.

9.8.19. Parts of the Proposed Scheme, including the Absorber Stack and the Proposed Jetty, would be visible in the long views out from the asset towards the east. This view, which is interrupted by intervening industrial buildings and chimney stacks, does not contribute to the asset's value. The digital ZTV shows that, at ground level, the Absorber Stack would be visible when glimpsed in views between the structures. Whilst it would not be visually prominent, the Absorber Stack and wider Carbon Capture Facility would still constitute new built form in the wider landscape (see **Figure 10-3: Visual Assessment Plan (Volume 2)**).

9.8.20. For the assessment of effects on Workshop Range to south west of main engine house Crossness Pumping Station, the heritage value of the Grade II listed building is **medium**. The magnitude of change is **low**. Therefore, there is likely to be a direct, permanent, **minor adverse** effect on Workshop Range to south west of main engine house Crossness Pumping Station (**not significant**).

Crossness Conservation Area (A6)

9.8.21. Crossness Conservation Area (**A6**) is situated approximately 760m to the west of the Site Boundary and is a heritage asset of **medium** heritage value, deriving from architectural and historic interest.

9.8.22. Parts of the Proposed Scheme, including the Absorber Stack and the Proposed Jetty, would be visible in the long views out from the Conservation Area towards the east. This view, which is interrupted by intervening industrial buildings and chimney stacks, does not make a significant contribution to the asset's value. The digital ZTV shows the Absorber Stack would be visible from much of the southern part of the Conservation Area at ground level, but less visible from the northern part where the listed buildings are. Whilst it would not be visually prominent, the Absorber Stack and the wider Carbon Capture Facility would still constitute new built form in the wider landscape.

9.8.23. For the assessment of effects on Crossness Conservation Area, the heritage value of the Conservation Area is **medium**. The magnitude of change is **low**. Therefore, there is likely to be a direct, permanent **minor adverse** effect on the Crossness Conservation Area (**not significant**).

No. 4 Jetty and Approach

9.8.24. No. 4 Jetty and Approach is situated approximately 750m to the north west of the Site Boundary. As a Grade II listed building, No. 4 Jetty and Approach is a heritage asset of **medium** value, which derives from its architectural and historic interest.

9.8.25. The Proposed Scheme would be visible in long views out from the asset towards the southeast. The digital ZTV shows that the Absorber Stack would be visible from this asset at ground level. However, this view does not contribute to the asset's value.

9.8.26. For the assessment of effects on No. 4 Jetty and Approach, the heritage value of the Grade II listed building is **medium**. The magnitude of change is **low**. Therefore, there is likely to be a direct, permanent **minor adverse** effect on No. 4 Jetty and Approach (**not significant**).

9.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

9.9.1. This section presents the additional mitigation and compensation measures that are relevant to the historic environment assessment. Consultation with GLAAS is currently ongoing; the precise mitigation strategy and timescales will be confirmed within the ES (see **Section 9.11**).

CONSTRUCTION PHASE

Marine/Intertidal

9.9.2. The uncertainty regarding the presence of wrecks or other submerged features within the River Thames foreshore/channel remains a risk. Within these areas, the presence, nature, date, and extent and value of any archaeological remains would need to be clarified by further survey, with any consequential mitigation strategy to be reported in the ES, as informed by ongoing engagement with GLAAS.

9.9.3. The survey method would need to be agreed with GLAAS but would likely take the form of foreshore survey and/or high-resolution geophysical data for archaeological analysis, comprising:

- foreshore walkover at very low tide to identify archaeological features and/or an Unmanned Aerial Vehicle (UAV) survey of the foreshore;
- magnetometry data;
- multi beam echo sounder (MBES); and
- side scan sonar (SSS).

9.9.4. Further data will be acquired to cover the capital dredge area and any area that could be affected by the redistribution of tidal flows (for example, if there will be additional scour). The results of the survey analysis will enable an appropriate mitigation strategy to be prepared for any significant archaeological remains that could be affected. The foreshore survey would be undertaken to inform the ES. The subsequent non-intrusive surveys would be undertaken post application for DCO consent as part of the wider Geotechnical Investigations (GI).

9.9.5. Although rare, in the unlikely event that archaeological remains of very high (National) value are identified, there may be a requirement, where practicable in the consented design, for their preservation *in situ*.

9.9.6. Mitigation could take the form of targeted excavation (preservation by record) and for remains of known low value, an archaeological watching brief may be required (for instance during the excavation of the berth dredge channel). This would ensure that archaeological remains were not removed without record. This additional mitigation would be included in the OCoCP.

Terrestrial

9.9.7. The potential for shallow surviving archaeological remains (i.e., later medieval, post-medieval or modern) across the Site is low and the potential for deeply buried prehistoric/Roman remains of high value (i.e., floodplain features such as fishtraps/trackways/jetties) is also considered low. As the main impact is limited to piling for the Carbon Capture Facility structures trial trench investigation is not considered appropriate, nor practicable to clarify the depth and value of archaeological deposits within the Site, as remains of heritage value would extend to a greater depth than standard evaluation trenching would reach.

9.9.8. In order to mitigate the potential impact of piling on deeply buried palaeoenvironmental remains, an updated Geoarchaeological Deposit Model is required. This would extend to cover the whole Site (including the marine and intertidal) and would use the existing extensive information on buried sediments to map the subsurface topography (i.e., prehistoric terrain beneath any superficial deposits of made ground and alluvium). The model would provide information on hydrology, vegetation and past landscape of the Site. It is recommended that the model is produced as part of the archaeological mitigation strategy, post-DCO submission. The strategy could be informed by a review of GI data, conducted post application for DCO consent. The exact requirements will be confirmed and agreed through consultation with GLAAS as the EIA progresses.

9.9.9. Any archaeological work would be undertaken in accordance with an approved Written Scheme of Investigation (WSI) in consultation with GLAAS and could be carried out under the relevant requirements of the DCO.

Historic Building Recording

9.9.10. Should the Belvedere Power Station Jetty (disused) be demolished, it is recommended that an Historic England Level 2 Historic Building Recording is undertaken prior to demolition. Level 2 recording comprises a descriptive record where the structure will be seen, described, and photographed. It will include a drawn record, photography and a written record. This will ensure that an accurate record of the Belvedere Power Station Jetty is archived with the GLHER and Archaeology Data Service for future research and understanding of heritage value. The work will be carried out in accordance with Historic England's 2016 Guidance note 'Understanding Historic Buildings: a guide to good recording practice.[22]

OPERATION PHASE

9.9.11. In response to potential operation phase effects on palaeoenvironmental and submerged remains, no additional design, mitigation or enhancement measures are proposed as these will be delivered through the construction phase measures set out above (see **Paragraphs 9.9.2** to **9.9.9**).

9.9.12. As no significant operation phase effects on above ground heritage assets beyond the Site Boundary are predicted, no further additional design, mitigation or enhancement measures are proposed for above ground heritage assets.

9.10. RESIDUAL EFFECTS

9.10.1. **Table 9-8** below summarises the residual effects associated with the Proposed Scheme.

Table 9-8: Historic Environment – Summary of Residual Effects

Description of the effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual effect
Construction Phase				
Potential physical effects on unknown buried heritage assets within the Site (archaeological remains), including potential submerged remains within the Thames foreshore (marine).	Palaeoenvironmental Remains	**Moderate Adverse (significant)**	Production and publication of a Geoarchaeological Deposit Model, secured through the application for development consent as part of the Archaeological Mitigation Strategy.	**Minor Adverse (not significant)**
	Potential Prehistoric and Roman Remains	**Minor Adverse (not significant)**	Geoarchaeological Deposit Model.	**Minor Adverse (not significant)**
	Unrecorded Post-medieval and Modern Remains	**Minor Adverse (not significant)**	No additional mitigation is proposed.	**Minor Adverse (not significant)**
	Post-medieval and Modern Marine Obstructions	**Moderate Adverse (significant)**	Further survey of the proposed dredged channel followed by archaeological mitigation. i.e., targeted excavation/recording, watching brief or preservation *in situ* (to be agreed with GLAAS).	**Minor Adverse (not significant)**

Description of the effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual effect
Demolition of non-designated above ground heritage assets within the Site during the construction phase.	Belvedere Power Station Jetty (disused), if removed as part of the Proposed Scheme	**Moderate Adverse (significant)**	Should the Belvedere Power Station Jetty (disused) be demolished, an Historic England Level 2 Historic Building Recording will be required, undertaken prior to demolition to offset the predicted effects. This will ensure that an accurate record of the Jetty is archived with the GLHER and ADS for future research and understanding of heritage value.	**Minor Adverse (not significant)**
Operation Phase				
Potential indirect effects on unknown buried heritage assets within the Site (archaeological remains), including potential submerged remains within the Thames foreshore (marine).	Palaeoenvironmental Remains	**Moderate Adverse (significant)**	Production and publication of an updated Geoarchaeological Deposit Model, secured by the DCO as part of the archaeological mitigation strategy.	**Minor Adverse (not significant)**
	Potential Submerged Remains	**Moderate Adverse (significant)**	Further survey of the proposed dredged channel followed by archaeological mitigation. i.e., targeted excavation/recording, watching brief or preservation *in situ* (to be agreed with GLAAS).	**Minor Adverse (not significant)**

Description of the effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual effect
Potential permanent effects on designated above ground heritage assets located beyond the Site Boundary and within the Study Area through changes to setting.	Crossness Pumping Station (A2-A4 and A6)	**Minor Adverse (not significant)**	No additional measures are proposed during the operation phase for above ground heritage assets.	**Minor Adverse (not significant)**
	No. 4 Jetty and Approach	**Minor Adverse (not significant**		**Minor Adverse (not significant)**

9.11. NEXT STEPS

9.11.1. Further work to be completed and included in the ES comprises:

- The PEIR baseline assessment has identified a potential for submerged remains within the intertidal foreshore and the River Thames. Whilst the potential for remains of very high value, requiring preservation *in situ*, is considered low, the uncertainty regarding the presence of wrecks or other submerged features) remains. As such, non-intrusive surveys will likely be required, if practicable. Consultation with GLAAS is currently ongoing and the survey method will likely take the form of foreshore survey and/or high-resolution geophysical data, in addition to multi beam echo sounder (MBES) and side scan sonar (SSS) for archaeological analysis. The proposed non-intrusive surveys would be undertaken post-DCO consent as part of the GI, although an intertidal foreshore walkover survey could be undertaken to inform the ES.
- The results of the survey would enable an informed decision in respect of an appropriate mitigation strategy for any significant archaeological assets. This might comprise targeted archaeological excavation, and/or a watching brief during the proposed dredge for remains of lesser value.

9.12. LIMITATIONS AND ASSUMPTIONS

9.12.1. The following limitations and assumptions have been identified:

- The nature of the archaeological resource, both buried and not visible, which means it can be difficult to predict accurately the presence and likely value of buried assets, and consequently the impact upon them, based primarily on a desk-based sources. The principal source of information is the GLHER.

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DECARBONISATION

CHAPTER 10: TOWNSCAPE AND VISUAL

Cory Decarbonisation Project

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TABLE

10. TOWNSCAPE AND VISUAL

10.1. INTRODUCTION

10.1.1. This chapter reports the preliminary assessment of the likely significant effects of the Proposed Scheme on townscape character and visual impact (TVIA) during construction and operation and describes:

- relevant policy, legislation and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operational phase.

10.1.2. This chapter assesses the impact on townscape as opposed to landscape due to the predominantly urban nature of the Site and Study Area. The definition of townscape used as the basis of this chapter is that described in GLVIA3[1] as: "*the landscape within the built-up area, including the buildings, the relationship between them, the different types of urban open spaces, including green spaces and the relationship between buildings and open spaces*".

10.1.3. An Arboricultural Impact Assessment (AIA) will consider the impacts of the Proposed Scheme on arboricultural features. The AIA will form a technical appendix to the TVIA chapter in the ES. The approach to undertaking the AIA remains as outlined in the EIA Scoping Report[2]. For information purposes a tree constraints plan is included in **Figure 10-1: Tree Constraints Plan (Volume 2)**.

10.2. POLICY, LEGISLATION, AND GUIDANCE

10.2.1. The policy, legislation, and guidance relevant to the assessment of TVIA for the Proposed Scheme is detailed in **Table 10-1**.

Table 10-1: Townscape and Visual Impact Summary of Key Policy, Legislation, and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011[3]	Sets out the Government's policy for delivery of major energy infrastructure and is currently the primary basis for decision making of applications within the Planning Act 2008 regime. Paragraph 5.10 Landscape and Visual sets out the overarching national policy and guidance for assessment of impact on landscape character and visual amenity for major energy infrastructure projects within England and Wales.
Draft Overarching National Policy Statement for Energy EN-1 2023[4]	This Draft Overarching National Policy Statement for Energy (EN-1) is part of a suite of draft NPSs issued by the Secretary of State of DESNZ. It sets out the government's policy for delivery of major energy infrastructure and will likely replace the 2011 NPSs by the time the application for the Proposed Scheme is submitted. With regards to TVIA the following paragraphs from the policy document relating to the assessment, mitigation and decision making process are of relevance for this assessment: Para 4.6.1 states that "*Applying "good design" to energy projects should produce sustainable infrastructure sensitive to place, including impacts on heritage, efficient in the use of natural resources, including land-use, and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible…* *Applicants must demonstrate in their application documents how the design process was conducted and how the proposed design evolved. Where a number of different designs were considered, applicants should set out the reasons why the favoured choice has been selected."* Para 5.10.2 states that "*Among the features which are common to a number of different thermal combustion technologies, cooling towers and exhaust stacks and their plumes have the most obvious impact on landscape and visual amenity. Visual impacts may be*

Policy, Legislation or Guidance	Description
	not just the physical structures but also visible steam plumes from cooling towers." Para 5.10.18 states that *"In reaching a judgment, the Secretary of State should consider whether any adverse impact is temporary, such as during construction, and/or whether any adverse impact on the landscape will be capable of being reversed in a timescale that the Secretary of State considers reasonable."* Para 5.10.20 states that *"All proposed energy infrastructure is likely to have visual effects for many receptors around proposed sites. The Secretary of State will have to judge whether the visual effects on sensitive receptors, such as local residents, and other receptors, such as visitors to the local area, outweigh the benefits of the project. Coastal areas are particularly vulnerable to visual intrusion because of the potential high visibility of development on the foreshore, on the skyline…"* Para 5.10.24 states that *"… adverse landscape and visual effects may be minimised through appropriate siting of infrastructure within that site, design including colours and materials, and landscaping schemes, depending on the size and type of the proposed project. Materials and designs of buildings should always be given careful consideration."*
National Planning Policy Framework (NPPF) 2023[5]	The NPPF sets out the Government's planning policies for England and how these should be applied. The NPPF provides guidance for planning authorities and developers on the conservation and assessment of landscape/townscape character and visual amenity in paragraphs 110, 131 and 170.
The London Plan 2021[6]	The Spatial Development Strategy for Greater London setting out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. The following policies relate to the protection and enhancement of townscape character and visual amenity: • Policy D1: London's form, character and capacity for growth; • Policy D3: Optimising site capacity through the design-led approach;

Policy, Legislation or Guidance	Description
	• Policy D4: Delivering good design; • Policy D9: Tall buildings; • Policy HC3: Strategic and Local Views; and • Policy HC4: London View Management Framework.
The Bexley Local Plan 2023[7]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development across the Borough. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. The following policies relate to the protection and enhancement of townscape character and visual amenity: • SP1: Achieving sustainable development – the spatial strategy; • SP5: Placemaking through good design; • DP11: Achieving high-quality design; • DP12: Tall buildings and building heights; and • DP13: Protecting local views.
London Environment Strategy 2018[8]	The London Environment Strategy seeks to ensure that London will become a "*zero carbon city by 2050*" by setting out policies and proposals in seven policy areas to address environmental challenges, including the transition to a low carbon circular economy. The Mayor wants to ensure "*London's businesses and workers are supported to be able to compete effectively in, and benefit from, this growing global market*".
Bexley Local Character Study 2021[9]	The Local Character Study defines spatial qualities and Natural Landscape Areas within the borough, qualities that should be protected and enhanced through planning policy and new development.
Crossness Conservation Area Appraisal and Management Plan 2009[10]	The Management Plan defines and records the special architectural and historic interest of the Crossness Conservation Area and identifies opportunities for enhancement. It identifies the extent, qualities, and management processes for the Crossness Conservation Area.

Policy, Legislation or Guidance	Description
Erith Road Conservation Area Appraisal and Management Plan 2008[11]	The document defines and records the special architectural and historic interest of the Erith Road Conservation Area and identifies opportunities for enhancement.
Woolwich Road Conservation Area Appraisal and Management Plan 2008[12]	The document defines and records the special architectural and historic interest of the Woolwich Road Conservation Area and identifies opportunities for enhancement.
Locally Significant Views within London Borough of Bexley 2021[13]	The document identifies locally designated views within the Borough. The *"views are worth considering as part of the design process when they possess architectural, townscape, landscape, or environmental quality".*
London View Management Framework 2012[14]	The document identifies views designated by the London Plan to be considered in the determination of planning applications.
South East Inshore Marine Plan 2021[15]	The South East Inshore Marine Plan area stretches from Felixstowe in Suffolk to west of Dover in Kent and incorporates the River Thames. It will help to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan area. The following policy covers seascape and landscape: Policy SE-SCP-1 states that "*the aim of the policy is to manage significant adverse impacts on the seascape and landscape of the south east marine plan area*". An assessment of seascape is not required as the Site is located within the Thames Estuary which is not considered to be a coastal landscape.
Legislation	
European Landscape Convention (ELC) 2000[16]	European Union treaty signed by the UK to include planning, protection and management of landscape within policy.

Policy, Legislation or Guidance	Description
Guidance	
National Planning Practice Guidance (2021)[17]	Explains the processes and tools that can be used through the planning system in England. This includes guidance on healthy and safe communities. It promotes good design that incorporates security as an intrinsic part of a development to achieve places that are safe and attractive, which function well, and which do not need subsequent work to achieve or improve resilience.
Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3) 2013[18]	Sets out industry guidelines for undertaking a landscape/ townscape and visual impact assessments.
Townscape Character Assessment Technical Information Note 05/2017 2018[19]	Provides advice on how to identify and assess townscape character.
Visual Representation of Development Proposals Technical Guidance Note 06/2019 2019[20]	Provides advice on how to capture and represent visual amenity through representative viewpoints and how the viewpoints should be presented.

10.3. SCOPING OPINION AND CONSULTATION

10.3.1. An EIA Scoping Opinion[21] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26th May 2023. The responses from the Planning Inspectorate and statutory consultees in relation to TVIA and arboriculture and how these requirements should be addressed by the Applicant are set out in **Table 10-2** below.

Table 10-2: Summary of the EIA Scoping Opinion in Relation to TVIA

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Planning Inspectorate			
3.6.1	Potential impacts on topography - construction and operation	*"The Scoping Report states that the Proposed Development is not likely to result in significant changes to the underlying topography. On the basis that significant topographical changes to facilitate the Proposed Development (via an increase in land levels) are not required, the Inspectorate agrees that potential impacts on topography during construction and operation are not likely to result in significant effects and this matter can be scoped out.* *If as part of the evolution of the design of the Proposed Development it is determined that a significant increase in land levels is required (for example, to protect against flooding), then the ES should assess any impacts on topography which are likely to result in significant effects".*	No response required.
3.6.2	Potential impacts on National Character Areas (NCAs) – construction and operation	*"The Scoping Report explains that "major developments including ports, waste disposal, marine dredging, and prominent power stations plus numerous other industry-related activities" are a key characteristic of the NCA within which the Proposed Development is located. Due to the industrial and marine nature of the Proposed Development, the Scoping Report states that changes arising from the Proposed Development are not expected to give rise to*	No response required.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		potential impacts on any of the NCAs within the TVIA Study Area. *Considering the nature and location of the Proposed Development and the characteristics of the surrounding area, the Inspectorate agrees that impacts on NCAs during construction and operation can be scoped out".*	
3.6.3	Potential effects on the London View Management Framework (LVMF) views - construction and operation	*"On the basis that the Proposed Development does not fall within the viewing corridor of the LVMF views, the Inspectorate is content that this matter can be scoped out".*	No response required.
3.6.4	Impacts to existing arboricultural features (from the Arboricultural Impact Assessment (AIA) to be appended to the ES Chapter 10: Townscape and Visual (Volume 1)) - operation	*"The Scoping Report states that operation of the Proposed Development will not result in loss of or damage to arboricultural features. Considering the nature and characteristics of the Proposed Development, the Inspectorate agrees that impacts to existing arboricultural features during operation can be scoped out".*	No response required.
3.6.5	Effects on receptors located beyond the refined TVIA study area – construction and operation	*"The Scoping Report explains that the 2km TVIA study area (as presented in the Scoping Report) will be refined through ZTV modelling and site work. The Scoping Report states that beyond the refined TVIA study area, significant effects on townscape and visual receptors are not anticipated.*	Final approval will be sought from the relevant stakeholders on the final Zone of Theoretical Visibility (ZTV) methodology, visual receptors,

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		The Inspectorate considers that the study area and ZTV should represent the extent of the likely impacts from all elements and phases of the Proposed Development. The Applicant should make effort to agree the methodology for the ZTV with relevant consultation bodies including local authorities. On this basis, Inspectorate agrees that any impacts on receptors located outside of the TVIA study area, once refined through ZTV modelling and site work, are unlikely to result in significant effects. This matter can be scoped out of the ES".	viewpoints and Study Area extent.
3.6.6	Viewpoints	*"The Scoping Report proposes ten viewpoint locations and states that the exact number and location of viewpoints will be refined during the assessment process.* *The number and location of viewpoints and visualisations should be justified in the ES and effort should be made to agree these details with relevant consultation bodies, including local planning authorities and Historic England".*	Number and location of viewpoints and visualisations is being consulted and agreed with relevant stakeholders, further detail is provided in **Table 10-4** below.
3.6.7	Limitations and assumptions	*"The ES should clearly present any assumptions made with regards to the height that the proposed mitigation planting would have reached by the assessment years, for the purposes of generating photomontages and reaching the assessment conclusions".*	The Design Approach Document (DAD), to be developed and included within the application for development consent, will set out the ecological, landscape (including planting and assumed heights) and BNG

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			design of the Proposed Scheme. This information will be used to inform indicative planting heights for Years 1 and 15 which will be presented within the ES.
3.6.8	Impacts from lighting	*"Impacts on townscape and visual amenity resulting from the introduction of lighting which are likely to result in significant effects should be assessed in the ES. Any proposed mitigation measures should be described and appropriately secured. The assessment should cross refer to other relevant aspect assessments and sensitive receptors (such as ecology and heritage)".*	An Outline Lighting Strategy will be developed and included within the application for development consent. TVIA specialists will be involved to minimise adverse lighting effects on townscape and visual receptors. The assessment of townscape and visual amenity will incorporate a qualitative appraisal of potential effects from the introduction of lighting associated with the Proposed Scheme on the night-time character of the area and will be presented within the ES. The scope and methodology of the assessment on the night-time character will be

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			agreed with relevant stakeholders during the ES Stage. The TVIA presented in this chapter does not include a night-time assessment.
London Borough of Bexley			
Townscape and Visual (including Arboriculture)	N/A	*"Policy SP1 of the Bexley Local Plan (2023) covers all new development proposals. This policy should be referenced in Table 9-1 of the Scoping Opinion".*	The Bexley Local Plan 2023[7] and its relevant policies, including, but not limited to SP1, have been considered as part of this technical chapter alongside other relevant policy, legislation and guidance. Further details on these are provided in **Table 10-1**.
Townscape and Visual (including Arboriculture)	N/A	*"Table 9-3 of the Scoping Opinion outlines the impacts which will be scoped in or out of further assessment. It is detailed that any potential impacts on topography (for both the construction and operation phases) be scoped out. The Council would suggest that this should only be the case if there are no significant changes proposed to topography. The Scoping Opinion states that there will not be, but it would be helpful to understand what 'no significant changes' means. Should the topography of the application site be*	Significant changes to topography will be undertaken to create a development platform upon which to locate the equipment above the flood breach level. Flood plain compensation is currently envisaged to be achieved via lowering selected bank levels

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		required to change to facilitate the development (via an increase in level), then this should be required to be scoped in as part of the further assessment".	within the Site. Further information on this is provided in **Chapter 11: Water Environment and Flood Risk (Volume 1)**. These matters will be assessed within Chapter 10: Townscape and Visual (Volume 1) of the ES in line with the methodology set out in this chapter. These changes are minor and are not expected to change the conclusions of the assessment presented in this technical chapter.
Townscape and Visual (including Arboriculture)	N/A	*"It is considered (based on Legislation requirements, and existing policy and guidance) that the other conclusions for further assessment are appropriate".*	No response required.

10.3.3. **Table 10-3** provides a summary of the consultation and engagement undertaken to inform the TVIA to date.

Table 10-3: Townscape and Visual Consultation and Engagement Summary

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
31st January 2023, Email	LBB	Preliminary Zone of Theoretical Visibility (ZTV) along with suggestion for 10 no. viewpoint locations issued for comment and recommendations on Study Area and selected viewpoints; and any sensitivities in relation to townscape or visual receptors which needed consideration.
3rd February 2023, Email	LBB	LBB confirmed that viewpoints are acceptable at this stage. The viewing platform at Lesnes Abbey was suggested as an additional viewpoint, along with Frank's Park and locally designated views, which were added as viewpoints. No specific reference was made to ZTV methodology, but this will be sought for the ES.

10.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

10.4.1. The TVIA of the Proposed Scheme has been undertaken in line with the legislation, policy and guidance described in **Section 10.2**.

POTENTIAL SIGNIFICANT EFFECTS

10.4.2. As set out in the EIA Scoping Report[22], the following components are considered likely to be subject to significant effects and therefore have been considered further in this assessment:

- Construction Phase:
  - townscape character;
  - locally designated views;
  - visual amenity; and
  - existing arboricultural features (to be presented in the AIA and not considered further within this technical chapter).

- Operation Phase:
  - townscape character;
  - locally designated views; and
  - visual amenity.

MATTERS SCOPED OUT

10.4.3. The following components are considered unlikely to be subject to significant effects and therefore have not been considered further in this assessment:

- Construction Phase:
  - topography;
  - NCA; and
  - LVMF views.
- Operation Phase:
  - topography;
  - NCA;
  - LVMF views; and
  - existing arboricultural features.

SENSITIVE RECEPTORS

10.4.4. The following sensitive receptors have been identified:

- change of character and vegetation cover within the Site;
- change in local townscape character (within approximately 2km of the Site Boundary);
- change in character and visual amenity from open spaces;
- change in visual amenity from the local Public Right of way (PRoW) network. See **Figure 10-2: Townscape and Visual Site Context (Volume 2)**;
- change in visual amenity from the local road network (within the 2km Study Area, see **Section 10.5**);
- change in visual amenity from residential areas with views towards the Proposed Scheme (and within the 2km Study Area, see **Section 10.5**); and
- arboricultural features (including trees and hedgerows, to be presented in the AIA and not considered further within this technical chapter).

10.4.5. A series of proposed viewpoints which are considered representative of the visual amenity receptors are outlined in **Table 10-4** below.

REPRESENTATIVE VIEWPOINTS

10.4.6. Following a review of the Riverside 2 ES[23], digital ZTV, site context and a walkover, a list of proposed viewpoint locations for the assessment of effects on visual amenity and locally designated views have been identified. These are listed within **Table 10-4** below and shown on **Figure 10-3: Visual Assessment Plan (Volume 2)**.

10.4.7. LBB was consulted on and agreed with the proposed viewpoints as part of EIA Scoping, as summarised within **Table 10-4** above.

10.4.8. A walkover was undertaken on 20th July 2023, during the summer season, to take verified photography. A further walkover will be undertaken from these viewpoints in winter to take verified photography under a worst-case scenario. Following the winter walkover, verified photomontages and a final ZTV will be prepared to inform the emerging design (preliminary masterplan), and these will be presented as figures to support the TVIA narrative in the ES.

Table 10-4: Suggested Representative Viewpoint Locations

Viewpoint Reference	Viewpoint Location	Reason For Selection
Sequential Views (more than one representative viewpoint along a route)		
SV1	England Coast Path, NCN1 and FP2 – Viewing Platform	Close-range views from recreational receptors along the nationally designated England Coast Path and nationally designated NCN1. The route is also a local PRoW designated as FP2. Approximately 90m west of the Site Boundary.
SV2	ECP, NCN1 and FP2	Mid-range views from recreational receptors along the nationally designated England Coast Path and nationally designated NCN1 . The route is also a local ProW designated as FP2. Approximately 600m west of the Site Boundary.
Representative Views		
VP1	FP2	Close-range views from recreational receptors of the locally designated FP2 within Crossness LNR. Within the Site.
VP2	ECP East, NCN1 and FP3	Close-range views from recreational receptors along the nationally designated ECP and nationally designated NCN1. The route is also a local ProW designated as FP3. Approximately 65m east of the Site Boundary.

Viewpoint Reference	Viewpoint Location	Reason For Selection
VP3	Clydesdale Way	Mid-range views from residential receptors on Clydesdale Way as well as road users from the local road network. Approximately 165m southeast of the Site Boundary.
VP4	The London Loop	Long-distance views from recreational receptors of the regionally designated London Loop. The view represents open views across the River Thames. Approximately 1km east of the Site Boundary.
VP5	Green Chain Walk	Long-distance views from recreational receptors of the regionally designated Green Chain Walk recreational route. Approximately 1.3km east of the Site Boundary.
VP6	Thames River Valley Panorama	Long-distance views from recreational receptors of the locally designated Thames River Valley Panorama viewpoint, as well as residential receptors of properties along Ruskin Road. The location is a local high point. Approximately 1.15km east of the Site Boundary.
VP7	Regional View Canary Wharf Cluster 1	Long-distance views from recreational receptors of the locally designated Regional View Canary Wharf Cluster 1, as well as recreational receptors of Lesnes Abbey greenspace and recreational visitors to the Lesnes Abbey Scheduled Monument. The Scheduled Monument is outside of the Study Area for historic environment and thus not considered in **Chapter 9: Historical Environment (Volume 1)**. Approximately 1.65km southwest of the Site Boundary.
VP8	Thamesmead Residential	Long-distance views from residential receptors at Thamesmead. Approximately 1.4km northwest of the Site Boundary.

BASELINE DATA COLLECTION

Desk Study

10.4.9. Information has been gathered primarily from a walkover, supported by desk study and engagement with relevant consultees (set out in **Section 10.3** and **10.4** above).

10.4.10. The key sources of desk information on baseline TVIA conditions have been:

- identifying natural and built features such as landform, vegetation, settlement patterns and hydrology in relation to the Proposed Scheme using Ordnance Survey (OS) mapping;
- studying aerial photography and online photographic resources;
- review of relevant national, regional and local planning policy documents; and
- review of relevant published landscape character assessments.

Walkover

10.4.11. A detailed walkover was carried out on 20th July 2023 during the summer season. The walkover was designed to collect data for the assessment of effects on townscape character, visual amenity, and locally designated views during summer months only. The following tasks were undertaken as part of the walkover:

- recording the baseline townscape and its character;
- checking and ground-truthing the visual receptors;
- identifying effects on both the townscape character and on visual amenity;
- consideration of potential design and mitigation measures; and
- site photography.

10.4.12. Photography was undertaken following the Landscape Institute Guidelines for Visual Representation Technical Guidance Note 06/19[20], with a full frame single-lens reflex (SLR) digital camera with a 50mm focal length lens, mounted on a tripod with a levelled panoramic head.

10.4.13. A walkover will be carried out later in 2023 to account for winter views, which will inform the assessment presented in the ES.

ASSESSMENT METHODOLOGY

10.4.14. The TVIA methodology identifies the value and susceptibility (vulnerability) of the identified receptors to assess their sensitivity to the Proposed Scheme. The likely magnitude of impact (change) experienced by these receptors is then considered and combined with the receptor's sensitivity to identify the significance of effect for the Proposed Scheme.

10.4.15. The key assessment stages include:

- Establishment of the baseline conditions: the townscape character and visual context of the receiving environment and its quality, value and sensitivity to change.
- Contributions to the iterative process of design and mitigation based on understanding the nature, form and features of the Proposed Scheme.
- An assessment of the magnitude of impact likely to result from the Proposed Scheme, both from construction and from permanent features and the operation of the Proposed Scheme, on visual amenity and the townscape resource.

- An evaluation of the significance of townscape and visual effects arising temporarily during construction and permanently, considering the sensitivity of resources and the magnitude of impact.

SIGNIFICANCE CRITERIA

Townscape

10.4.16. For effects on the townscape, the assessment of significance is determined by considering the magnitude of impact arising from the Proposed Scheme on each of the features and elements that make up the character of the resource, bearing in mind the value of the townscape (and/or of specific features and elements) and the ability of the townscape to accommodate change of the type proposed (i.e., its sensitivity).

10.4.17. Townscape sensitivity will depend on the character of the receiving townscape, the nature of the Proposed Scheme and the nature of change. Broad criteria and example scenarios informed by GLVIA3[1] are set out in

10.4.18. **Table 10-5** below. It should be noted that the levels are indicative, and arbitrary divisions of a continuum. In the assessment, professional judgement is used to determine the overall level.

Table 10-5: Townscape Sensitivity

Classification	Criteria
High	Townscape characteristics or features with little or no capacity to absorb the type of change proposed without fundamentally altering current character. Townscape designated for its international or national townscape value or with highly valued features. Outstanding example in an area of well cared for townscape or set of features that combine to give a very strong sense of place. Few detracting or incongruous elements.
Medium	Townscape characteristics or features with moderate capacity to absorb change without fundamentally altering their present character. Townscape designated for its local townscape value or a regional designated townscape where the characteristics and qualities that led to the designation of the area are less apparent or are partially eroded or an undesignated townscape which may be valued locally – for example an important open space. An example of a townscape or a set of features which is relatively coherent, with a good but not exceptional sense of place - occasional buildings and spaces may lack quality and cohesion.
Low	Townscape characteristics or features which are tolerant of change without determent to their present character. An area with a weak sense of place and/or poorly defined character /identity. No designation present or of low local value or in poor condition. An example of monotonous unattractive visually conflicting or degraded townscape or set of features.

10.4.19. The magnitude of impact on the townscape resource is the degree of change that would arise if the Proposed Scheme were to be completed. Factors to consider are the scale of the impact, the nature of the impact, whether it is an adverse or beneficial change, and the timescale involved (i.e., temporary, short, medium or long term/permanent).

Table 10-6: Townscape Magnitude of Impact

Classification	Size or Scale of Change	Geographical Extent	Duration	Reversibility
Major	Highly noticeable change, affecting most key characteristics and dominating the experience of the townscape Introduction of highly conspicuous new development.	Extensive, affecting the entire townscape area	Long term (10+ years)	Permanent /Irreversible
Moderate	Noticeable change, affecting some key characteristics and the experience of the townscape Introduction of some new elements.	Affecting the application Site and a proportion of the townscape area greater than the immediate setting	Medium-term (5-10 years)	Partially Reversible /Temporary
Low	Localised change, affecting some characteristics and the experience of the townscape Introduction of small or relatively inconspicuous new elements.	Limited to within the application Site and immediate setting	Short term (0-5 years)	Reversible
Negligible	No or very little change from baseline conditions Change not material, barely distinguishable or indistinguishable.	Limited to within the application Site and immediate setting	Short term (0-5 years)	Reversible

Visual

10.4.20. For effects on visual amenity, the assessment of significance is determined by considering the sensitivity of the visual receptor and the magnitude of impact on visual amenity arising from the Proposed Scheme.

10.4.21. Visual assessment is concerned with the views that are available to people who may be affected by the Proposed Scheme, including their perception and response to changes in these views, and visual amenity.

10.4.22. Visual effects may result from the changes in the composition of views or overall visual amenity consequent to the introduction of the Proposed Scheme. The degree to which people will be affected by change depends on factors, including:

- the activity of the receptor, such as taking part in leisure, recreational and sporting activities, travelling through the area or working;
- the value of the viewing place or viewpoint, as reflected by designations, inclusion in guidebooks or the facilities provided for visitors, for example;
- whether receptors are likely to be stationary or moving and how long they will be exposed to views of the Proposed Scheme;
- the extent of the route or area over which the change would be visible;
- whether receptors will be exposed to the change daily, frequently, occasionally or rarely; and
- whether views are oblique or direct.

10.4.23. It is widely accepted that the magnitude of change in relation to views tends to decrease with distance. A desktop study determined likely areas where there could be views of the Site or the Proposed Scheme. Fieldwork has further clarified the influence of existing landform, buildings, and vegetation on the degree of potential views.

10.4.24. Visual sensitivity is categorised by the sensitivity of the visual receptor and will include local residents; users of promoted routes, PRoW and other areas of open space or recreational landscapes; people at work; and people travelling along roads or railway lines.

10.4.25. The magnitude of impact on visual amenity is the degree of change that would arise if the Proposed Scheme were brought forward when compared to the existing situation.

10.4.26. Factors to consider are the scale of the impact, the nature of the impact, whether it is an adverse or beneficial change, and the timescale involved (i.e., temporary, short, medium or long term/permanent).

Significance of Effect

10.4.27. The objective of the assessment process is to identify and evaluate the likely significant effects arising from the Proposed Scheme. Consideration is given to the residual effects likely to arise from the completed scheme, taking into account likely broad mitigation measures and change over time. For the purposes of the assessment within this chapter, the design, mitigation and enhancement measures set out in **Section 10.6** and **Section 10.8** have been taken into account. The effects of the Proposed Scheme upon the baseline have been identified and assessed at two points in time:

- **Construction Phase**: during construction; and
- **Operation Phase:** in years 1 and 15 of operation.

10.4.28. Whilst there is a large degree of professional judgement involved in determining the significance of townscape and visual effects, they can broadly be determined by the interaction of the sensitivity of the receptor and magnitude of change.

10.4.29. The gradations of magnitude of change and level of effect used in the assessment represent a continuum, which are described in a five-point scale: large; moderate; slight; negligible, no-change. Where appropriate, this assessment uses intermediate descriptors, such as slight-negligible, slight-moderate or moderate-large, where the assessor considers that the effect falls between the levels used.

10.4.30. Effects can be either beneficial or adverse and, in some cases, neutral (neither beneficial nor adverse). Effects assessed as moderate or greater are considered to be significant. Effects assessed to be slight-moderate or below are considered to be not significant.

10.4.31. The effects diagram provided below illustrates the typical relationship between the magnitude of effect and the sensitivity of the receptor.

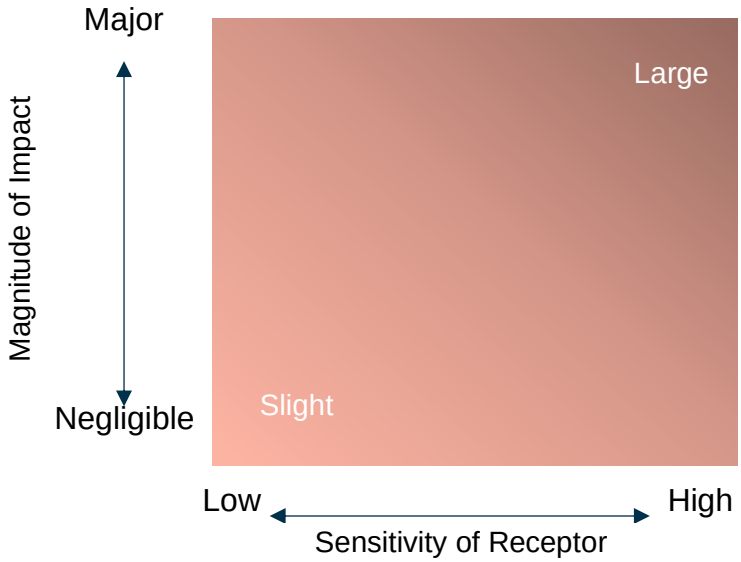

Figure 10-4: Significance of Effect Diagram

STUDY AREA

10.4.32. A preliminary ZTV informed an understanding of the visual extents of effects, followed by a site visit to inform judgement on its accuracy and selection of receptors. The ZTV was created based upon a maximum proposed height of the two new Absorber Columns (inclusive of stacks) of 113m above ordnance datum (AOD). The Digital ZTV shows the theoretical extent of the area from which the Absorber Columns (inclusive of stacks) at this height are likely to be visible. The Digital ZTV demonstrates the worst-case scenario; in reality, other built form and other features, such as hedgerows or street trees, are likely to provide filtering or reduction of views. The Digital ZTV was produced based on 1m resolution LIDAR data (Digital Terrain Model and Digital Surface Model based data) and is based on a user height of 1.6m AOD.

10.4.33. For the assessment of impacts during construction and operation, the Study Area extends to 2km from the Site Boundary, see **Figure 10-2: Townscape and Visual Site Context (Volume 2)**. The Study Area has been determined by the ZTV and walkover, taking into consideration landform, land use, landscape elements, townscape character, predicted visibility of the Proposed Scheme within the townscape and an identification of the nearest visual receptors.

10.4.34. **Figure 10-3: Visual Assessment Plan (Volume 2)** illustrates the digital ZTV, location of the Site for the Proposed Scheme, the 2km Study Area, and LBB suggested viewpoint locations as described above in **Table 10-4**.

10.5. BASELINE CONDITIONS AND FUTURE BASELINE

10.5.1. The key sources of desk information on baseline conditions have been:

- analysis of OS mapping relating to landform, vegetation and settlement patterns;
- consideration of historic OS maps to understand the development history of the area;
- analysis of aerial photography and online photographic resource to identify key landscape/townscape designations/receptors and policies;
- desk-based review of documents relevant to townscape character and visual amenity within the Study Area including landscape / townscape character assessments, previous EIAs and relevant planning documents; and
- analysis of online planning designations map, Planning Datamap[24].

10.5.2. A short summary of the baseline conditions is presented below. The baseline conditions described align with the Study Area presented in **Section 10.5**.

BASELINE CONDITIONS

Topography

10.5.3. The townscape within and surrounding the Proposed Scheme is generally flat lying, at approximately 2m AOD. The townscape then rises to the south, where local hills peak at approximately 55m AOD. The low topography is due to the close proximity to the River Thames.

Land Use

10.5.4. The northern section of the Site Boundary contains Riverside 1, the foreshore of the River Thames, the Middleton Jetty and the Belvedere Power Station Jetty (disused) located to the north of the Iron Mountain Records Storage Facility. The southern section of the Site Boundary contains the Munster Joinery Warehouse, and the area consists of coastal and floodplain grazing marshes, multiple ponds and ditches and areas of grassland used for horse grazing. The western section of the Site Boundary contains part of the Crossness LNR.

Townscape

10.5.5. The townscape near the Site is largely industrial in nature with numerous industrial/business estates in the surrounding area, as detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**. The built form within the area surrounding the Site is typical of these land uses including functional building design that is large in scale, with extensive floor areas and tall heights.

10.5.6. The Crossness Sewage Treatment Works, located approximately 230m to the west of the Site Boundary, comprises a disused sludge incinerator and the Crossness Pumping Station. The Munster Joinery Warehouse is situated within the Site, while the closest individual business operations located adjacent to the Site Boundary are the Lidl Warehouse/Belvedere Regional Distribution Centre to the south, and the Iron Mountain Records Storage Facility and Asda Belvedere Distribution Centre to the east. Other notable individual business operations close to the Site Boundary include:

- Starbucks Drive Thru and Lidl, approximately 110m southeast;
- Belvedere Wharf, approximately 350m east;
- Asda ASC Recycling Centre, approximately 350m east; and
- The Amazon UK DBR1 and Erith Driving Test Centre, approximately 380m east.

10.5.7. The wider Study Area primarily includes the residential area of Belvedere, which includes Franks Park and Bexley College, and is located approximately 170m south of the Site Boundary. Thamesmead residential area is located approximately 1.7km northwest of the Site Boundary, beyond Crossness Sewage Treatment Works. Belvedere can be characterised primarily as pre-war Victorian and Edwardian development with two storey terraced properties, however, there was significant reconstruction in areas following World War II. Thamesmead can be characterised as late 1960s block development with buildings varying in height up to four storeys. Rainham Landfill is located approximately 2km east of the Site Boundary on the northern bank of the River Thames. The export facility for the Ford of Britain subsidiary of Ford Motor Company is also located on the northern bank of the river. There are numerous jetties protruding into the River Thames, further details on the jetties are provided in **Chapter 19: Marine Navigation (Volume 1)**.

10.5.8. Community facilities lie within 100m of the Site Boundary including: the Morgan Public House, approximately 40m east (on the A2016 Picardy Manorway); and the Travelodge London Belvedere approximately 55m east, churches and primary schools all located approximately 60m southeast. Further information about residential properties and community facilities is in **Chapter 14: Population, Health, and Land Use (Volume 1)** of this PEIR.

10.5.9. The river setting along this stretch of the Thames remains open in nature following the patterns in the medieval field drainage system established since the embankment of the River Thames, probably during the 13th Century. Due to its exposed nature, relative remoteness from populated areas and proximity to the River Thames the location supports a complex mosaic of flora with occasional formally planted trees associated with the local industrial built heritage. Large level areas including Crossness LNR and designated MOL combine to produce a green and open setting for the mix of buildings and associated infrastructure. All contribute to the character of the area.

10.5.10. In visual terms the historical link between the man-made landscape comprising predominantly industrial and office buildings, and the river has been partially severed by the construction of the exposed concrete flood defence wall. The riverside path/cycleway mitigates this to some extent. Wind turbines and tall chimney stacks feature throughout long-distance views within the townscape. To the south is the A2016 Picardy Manorway/Eastern Way and a railway line.

National Character Areas[25]

10.5.11. NCA are a distinct and recognisable area of character at a national scale.

10.5.12. The Proposed Scheme is located within NCA 81: Greater Thames Estuary (**Figure 10-2: Townscape and Visual Site Context (Volume 2)**). The NCA covers a vast area. Two other NCA are situated within the Study Area:

- NCA 113: North Kent Plain, approximately 1km to the south of the Site Boundary;
- NCA 111: Northern Thames Basin, approximately 1.4km to the north; and
- NCA 112: Inner London, situated just outside the Study Area.

Townscape Character Areas

10.5.13. There are no published townscape character areas within the LBB, where the Proposed Scheme is situated. Neither are there any within London Borough of Havering or London Borough of Barking and Dagenham, both located to the north of the Site Boundary on the opposite bank of the River Thames.

Cultural Heritage Assets

10.5.14. Lesnes Abbey Scheduled Monument and Grade II listed building is situated approximately 1.8km southwest of the Site Boundary.

10.5.15. There are no Registered Parks and Gardens within the Study Area.

10.5.16. There are three Conservation Areas within the Study Area which are:

- Crossness Conservation Area, approximately 760m to the west of the Site Boundary comprising a complex of industrial buildings dating from the second half of the 19th and early 20th Century alongside related engineering works and sequence of large open spaces pointing to the site's original rural setting;
- Erith Road Conservation Area, approximately 1.5km to the south of the Site Boundary; and
- Woolwich Road Conservation Area, approximately 1.6km to the south of the Site Boundary.

10.5.17. There are no listed buildings within the Site. There are nine Listed Buildings within the Study Area (distances shown are from the Site Boundary):

- No. 4 Jetty and approach, formerly at Samuel Williams and Company, Dagenham Dock, approximately 750m to the northwest;
- Workshop Range to south east of Main Engine House Crossness Pumping Station, approximately 875m to the west;
- Crossness Pumping Station, approximately 900m to the west;
- Bexley College (Former Erith Technical Institute) including attached walls railings and gate piers, approximately 1.4km to the south;
- Parish Church of All Saints, approximately 1.5km to the south;
- Ruins of Lesnes Abbey, approximately 1.8km to the west;
- Parish Church of St John the Baptish, approximately 1.7km to the southeast; and
- First World War Memorial at St John the Baptist Church, Erith, approximately 1.7km to the southeast.

10.5.18. See **Figure 10-2: Townscape and Visual Site Context (Volume 2)** for location of heritage assets.

10.5.19. Heritage features have been included for their contribution to the value of the associated townscape and the visual amenity experienced by visitors to heritage assets. For assessment relating to the impact on heritage assets, refer to **Chapter 9: Historic Environment (Volume 1)**.

Public Rights of Way

10.5.20. The ECP 'Grain to Woolwich' runs along the southern bank of the River Thames and passes through the Site. This section of the England Coast Path is also designated as NCN1 connecting Dover and the Shetland Islands and Thames Path (FP3), see **Figure 10-2: Townscape and Visual Site Context (Volume 2)**.

10.5.21. The London Loop Section 24 runs alongside a section of the River Thames' northern bank, approximately 1km east of the Site Boundary. The route is also designated as NCN13.

10.5.22. Two sections of the Green Chain Walk pass through the Study Area, Section 1 which runs on a north-south axis is situated approximately 1.3km east of the Site Boundary and Section 2 which runs on an east-west axis along the northern side of the local hills through Lesnes Abbey Wood and Frank's Park is situated approximately 1km south of the Site Boundary.

10.5.23. There are three PRoW[26] within the Site, as shown in **Figure 2-1: Public Rights of Way, Cycle Routes and Metropolitan Open Land (Volume 2)**:

- FP2;
- FP3; and

- FP4.

10.5.24. There are two further PRoW close to the Site:

- FP1; and
- FP242.

10.5.25. There are no areas of registered Common Land/Open Access Land[a] within the Study Area.

Landscape Designations

10.5.26. There are no Areas of Outstanding Natural Beauty (AONB), National Parks or Country Parks within the Study Area. The closest Country Park is Beam Valley Country Park, located just over 2km north of the Site Boundary.

Green Belt

10.5.27. The Site is not within an area of Green Belt.

Metropolitan Open Land

10.5.28. The Site and its immediate context is designated Metropolitan Open Land (MOL) and other Local Plan open space designations. These policy designations also apply to other locations within the Study Area, see **Figure 10-2: Townscape and Visual Site Context (Volume 2)**.

Visual Designations.

10.5.29. There are several Locally Significant Views within the Study Area, as defined by LBB. The following are located within 2km of the Site Boundary:

- Canary Wharf Cluster 1 – regional view from the established viewing platform within Lesnes Woods; and
- Thames River Valley Panorama – view from Ruskin Road.

10.5.30. The Proposed Scheme does not fall within the viewing corridor of the LVMF views.

FUTURE BASELINE

10.5.31. The future baseline describes the baseline conditions that are expected to develop and evolve if the Proposed Scheme were not to proceed.

10.5.32. Existing premises within the Site would remain at their current locations should the Proposed Scheme not proceed. These include Riverside 1, Middleton Jetty and the Munster Joinery Warehouse.

[a] Land mapped as Conclusive Registered Common or Access Land under the Countryside Rights of Way (CRoW) Act 2000.

10.5.33. Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken) would be operational in the future baseline and appear in views throughout the townscape. An assessment of the Proposed Scheme against the future baseline (with the Proposed Scheme in place and so Munster Joinery removed) will be presented within the ES. For each receptor, an assessment against the existing baseline (without Riverside 2) and an assessment against the future baseline (to account for the impacts during operation of Riverside 2 and the Proposed Scheme) is provided.

10.6. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

10.6.1. This section provides a summary of likely design, mitigation and enhancement measures that are considered for this PEIR chapter assessment.

10.6.2. The ES will be based on a more mature Proposed Scheme design supported by a description of mitigation measures and considered design principles that will govern emerging and final design decisions.

CONSTRUCTION PHASE

10.6.3. Relevant design, mitigation, and enhancement measures during construction will include consideration of the following, which will be confirmed within the OCoCP unless stated otherwise:

- Areas would be cleared for construction as close as practicable to works commencing and top soiling, reseeding and planting would be undertaken as soon as practicable after sections of work are complete.
- The core Temporary Construction Compounds (laydown areas) will be located centrally within the Site to minimise their townscape and visual effects (as shown on **Figure 1-3: Indicative Site Layout Plan (Volume 2)**).
- Construction area(s) would be kept tidy (e.g., free of litter and debris).
- Work during the hours of darkness will be avoided as far as practicable and where necessary directed lighting would be used to minimise light pollution/glare (this would be set out in the Outline Lighting Strategy which will accompany the application for development consent).
- The roads providing access to the construction site will be kept free of excessive dust and mud as far as is reasonably practicable.
- Lighting levels would be kept to a minimum necessary for security and safety (this would be set out in the Outline Lighting Strategy which will accompany the application for development consent).
- Stockpiles, would be utilised to screen views of construction activities and light pollution within the surrounding area, where practicable.
- Site hoarding erected to minimise intrusion from construction activities on PRoW.

OPERATION PHASE

10.6.4. The design of the Proposed Scheme is ongoing and will be developed to deliver and optimised layout and massing in the final operational masterplan. Relevant design, mitigation, enhancement measures and improvements in the Environmental Opportunity Areas will be identified in the OLEMP and DAD, and these will include consideration of:

- Focus on the delivery of a coherent design for the operational facility including built form and consideration of colour and materials and the nature of operational site enclosure;
- Provision of new planting within the Site at a range of heights from ground plane to canopy; and
- Strengthening of open areas within the Site forming an attractive green context to the west of the site including improved reeded ditches, a characteristic of the area.

10.6.5. The TVIA assessment within this chapter considers the broad likely mitigation measures outlined above, whilst recognising the uncertainty at this stage of design development. Ongoing design development will form the basis for the TVIA assessment that will be presented within the ES.

10.7. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

CONSTRUCTION PHASE

10.7.1. The likely potential significant townscape and visual effects associated with the construction phase are set out below.

10.7.2. The construction assessment presented in this chapter is appropriate for both construction programme options, as set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** as the effects would continue to be considered as ‘temporary’.

10.7.3. The construction assessment presented in this chapter is applicable to the existing baseline as well as the future baseline (including operational Riverside 2). The assessment has considered the scale, nature, and duration of construction activities which would likely be largely equivalent when assessed against the existing baseline and the future baseline.

Potential Effects on Townscape Character

Site Character

10.7.4. The construction activities associated with the Proposed Scheme will likely have direct impacts on the landscape fabric within the Site, including changes to specific features such as ground re-profiling and land cover. The visual environment will also alter within, and in the vicinity of, the Site with visible proposed construction activity including machinery and earthworks. Impacts on the Crossness LNR and Local Plan open space designations will occur.

10.7.5. The character of the Site is of medium quality with distinctive characteristics and features of local value with a moderate capacity to absorb change without fundamental alteration to present character.

10.7.6. The Site character sensitivity is considered to be medium as it is not a designated landscape but has some features worthy of conservation, and the magnitude of impact is considered high. Therefore, there is likely to be a direct, temporary, short term, **large adverse (significant)** effect on the Site character during the construction phase.

Townscape Character

10.7.7. There is a potential for change in local townscape character within the Study Area. There are no published townscape character areas within LBB, where the Proposed Scheme is situated, or within London Borough of Havering or London Borough of Barking and Dagenham.

10.7.8. The proposed construction activities, notably cranes, vegetation loss and traffic management requirements have the potential to impact the townscape character of these areas, albeit in the short term. Direct impacts on the townscape character include changes to specific features and elements including landcover and visible construction plant etc. The existing character is of medium quality with numerous distinctive features including the industrial heritage and infrastructure associated with the Crosswell Conservation Area, mix of waste and commercial land uses, and large tracts of open naturalised grassland. There are no landscape designations, and the general townscape is readily influenced by industrial uses. The overall sensitivity of the receiving townscape is considered to be low, and the magnitude of impact is considered to be moderate. Therefore, there is likely to be a direct, temporary, short term, **slight-moderate adverse (not significant)** effect on the townscape character during the construction phase.

Potential Effects on Visual Amenity (including locally designated views)

Open Spaces

10.7.9. The Proposed Scheme is located partially within Crossness LNR, MOL, and Local Plan open space designations. There are also several areas of open space within the Study Area, the visual amenity for which may be impacted by the Proposed Scheme. The largest is Lesnes Abbey Woods, located approximately 1.65km southwest of the Site Boundary which includes a locally designated view (VP7 – Regional View Canary Wharf Cluster 1).

10.7.10. Of these areas of open space, the following components are particularly sensitive to change:

- Lesnes Abbey Woods – located approximately 1.65km southwest of the Site Boundary;
- Frank's Park – located approximately 1.3km east of the Site Boundary;
- Local Plan open space designations – within the Site; and
- Crossness LNR – within the Site.

10.7.11. The construction activities associated with the Proposed Scheme will likely have both direct and indirect impacts on the visual amenity of the users of the open spaces within the Study Area. Users may experience changes with views of construction activities such as plant, machinery, cranes, and temporary lighting. Construction activities will likely occupy a significant portion of views from Local Plan open space designations and Crossness LNR. The activities would likely be discernible but occupy a small portion of views for receptors at Lesnes Abbey Woods and Frank's Park due to due to distance, change in topography, and intervening built form and vegetation.

10.7.12. The sensitivity of the users of the open spaces where recreation and enjoyment of the setting is important is considered high, and the magnitude of impact also considered high. Therefore, there is likely to be a direct, temporary, short term, **large adverse (significant)** effect on the users of the open spaces within the Study Area during the construction phase.

Public Rights of Way

10.7.13. There is the potential for construction activities associated with the Proposed Scheme to have significant impacts on the PRoW network within the Study Area, some of which run next to the Proposed Scheme.

10.7.14. Users of the ECP are likely to experience long sequential views of the construction activities.

10.7.15. Users of the London Loop Section 24, which extends alongside a section of the River Thames' northern bank, approximately 1km east of the Site Boundary, would have distant views of construction activities screened in part by existing built form.

10.7.16. Users of PRoW within the Site and into the vicinity of the Site would experience direct views of construction activities. Whilst the nature of the construction activities would not be entirely out of character for the area, the users of the PRoW, particularly those that cross the Crossness LNR and users of the Thames Path (FP3) are predicted to be impacted by the increase in construction activity.

10.7.17. The construction activities associated with the demolition of the Belvedere Power Station Jetty (disused), and construction of the new jetty and the elevated gantry, would be localised and experienced mainly by users of the Thames Path (FP3). Whilst the magnitude of impact on users of FP3 may be significant, it would be transient and experienced as part of a sequence of views for users of the Thames Path (FP3). It is unlikely other PRoW would experience the construction activity here and overall the impact on PRoW within the Study Area is not predicted to be significant. Should the disused jetty be retained in the emerging design, the construction activities would likely slightly reduce in magnitude of impact on users of PRoW. The assessment will describe the qualitative change for affected receptors in respect to the visible components of each view, and consideration for the wider visual context. This will be assessed and confirmed within the ES.

10.7.18. The sensitivity of the users of the PRoW (Thames Path) is considered medium as views of the surroundings contribute to the appreciation, experience and enjoyment of the route, but set within an existing industrial backdrop. The user's susceptibility to the type of development proposed is therefore considered to be medium. The magnitude of impact is considered moderate. Therefore, there is likely to be a direct, temporary, short term, **moderate adverse (significant)** effect on the users of the PRoW within the Study Area prior to the implementation of mitigation measures.

Road Network

10.7.19. The proposed construction activities, notably cranes, vegetation loss, earth movement and traffic management have the potential to impact the visual amenity of local road network within the Site.

10.7.20. Within the Study Area, the Proposed Scheme would likely be visible from the A2016 Picardy Manorway/Eastern Way, Bronze Age Way, Yarnton Way, and from a network of minor and unclassified roads that cross the Study Area.

10.7.21. Construction activities will likely occupy a small but noticeable portion of views for users of the road network within the Study Area. Roadside vegetation that extends alongside many of the routes would screen substantial portions of the views into the surrounding townscape. Whilst glimpsed and periodic views of the Proposed Scheme would be tangible for these receptors their experience of the view will be transient in nature.

10.7.22. The sensitivity of the users of the road network is considered low as views of the surroundings are not an important contributor to appreciation and experience of the routes and the user's susceptibility to the type of development proposed is therefore considered to be low. The magnitude of impact is considered low. Therefore, there is likely to be an indirect, temporary, short term, **slight-adverse (not significant)** effect on the users of the road and rail within the Study Area during the construction phase.

Residential

10.7.23. There is the potential for change in visual amenity from residential areas (people occupying their homes) with views towards the construction activity of the Proposed Scheme and within the Study Area. The change is due to the perception of construction activities, notably cranes, vegetation loss, earth movement and traffic management r which have the potential to significantly impact the visual amenity for residential receptors. Existing private residential amenity as a potential receptor has been scoped out of this assessment.

10.7.24. The residential area of Belvedere is located, at its closest point, approximately 170m south of the Site Boundary. Thamesmead residential area is located approximately 1.7km northwest of the Site Boundary.

10.7.25. The construction activity associated with the Proposed Scheme would be visible to a varying degree from these residential receptors. Views from residential properties are largely limited to those on the edges of settlements orientated towards the Site including those on Lytham Close in Thamesmead and from those located on higher ground along the edges of the Study Area.

10.7.26. Construction of the Proposed Scheme would likely have limited impact on the views from properties within the Study Area due to the distance, intervening built form and vegetation, and the existing industrial nature of the townscape as illustrated on **Figure 10-3: Visual Assessment Plan (Volume 2)**.

10.7.27. The sensitivity of private residential receptors (people occupying their homes) is considered to be high due to the distance of the receptors from the Proposed Scheme and orientation and stationary nature of views, and the magnitude of impact is considered low. Therefore, there is likely to be a direct, temporary, short term, **slight-moderate adverse (not significant)** effect on residential receptors during the construction phase.

OPERATION PHASE

10.7.28. The likely potential significant effects for townscape and the visual environment associated with the operation phase are set out below.

10.7.29. The assessment considers the impact at Year 1 and at Year 15 taking account of anticipated embedded and additional mitigation, including proposed planting, as currently understood. The emerging design of the Proposed Scheme will continue to be developed to deliver an optimised layout. Relevant design, mitigation and enhancement measures will be identified in the OLEMP and DAD for the Site west of the main operational area (the identified Mitigation Area). The section below outlines the preliminary predicted effects the operation phase will have on townscape and visual amenity of the existing baseline environment.

10.7.30. The operational assessment presented in this chapter is applicable to the existing baseline as well as the future baseline (including operational Riverside 2). The assessment has considered the scale and nature of the Proposed Development and the magnitude of impact would likely be largely equivalent when assessed against the existing baseline and the future baseline.

10.7.31. Where increased magnitude of impact is anticipated, a separate assessment is included for each receptor to consider the impact the Proposed Scheme would have alongside Riverside 2, which is due to be operational in 2028.

Potential Effects on Townscape Character

Site Character

10.7.32. The operation phase of the Proposed Scheme will have unavoidable impact on the landscape fabric within the Site comprising a mix of grassland and ‘brownfield’ areas allocated for developments. Ground re-profiling and removal of vegetation cover will remain following construction and the character of the Site will materially change. Whilst it is likely that embedded mitigation measures will reduce effect(s) of the Proposed Scheme on the Site character over time, the physical changes will remain.

10.7.33. The sensitivity of the Site character is considered medium, and the magnitude of impact is considered moderate. Therefore, there is likely to be a direct, permanent, long term **moderate adverse (significant)** effect on the Site character, during the winter months at Year 1 prior to the implementation of additional mitigation measures.

10.7.34. It is predicted that despite likely opportunities for embedded mitigation including the establishment of screen planting the magnitude of impact at Year 15 will remain moderate. Therefore, there is likely to be a direct, permanent, long term, **moderate adverse (significant)** effect on the Site character at Year 15.

Townscape Character

10.7.35. The local townscape character (within the Study Area) of the Site will alter, as a result of new buildings and structures including the two new Absorber Columns (inclusive of stacks) and temporary onshore storage tanks, fencing and lighting.

10.7.36. The townscape is largely industrial with numerous industrial estates in the surrounding area, as detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

10.7.37. The Proposed Scheme during operation will likely have direct and indirect impacts on the townscape character including changes to specific features and elements that make up the townscape including introduction of new structures. There are no landscape designations within the Site, the receiving townscape from which the Proposed Scheme will be experienced or associated with the LBB open space policy designations or the Crossness LNR. The character of the townscape is of low to medium quality with an industrial character influenced by several developments of a similar scale and nature of the Proposed Scheme. The Proposed Scheme will have direct impacts on the land and assets/ features within the Site.

10.7.38. The sensitivity of townscape character areas is considered to be low, and the magnitude of impact is considered minor-moderate. Therefore, there is likely to be a direct, permanent, medium-term **slight-moderate adverse (not significant)** effect on the townscape character areas, during the winter months at Year 1, prior to the implementation of additional mitigation measures.

10.7.39. Proposed planting will establish over time which, to some extent, will help integrate the Proposed Scheme into the townscape and partially screen views from receptors within the Study Area. The scale and nature of the Proposed Scheme, however, will mean that the proposed planting will likely result in little to no change in the magnitude of impact on overall townscape character. The magnitude of impact at Year 15 would remain minor-moderate. Therefore, there is likely to be a permanent, long term **slight-moderate adverse (not significant)** effect on the townscape character at Year 15.

Potential Effects on Visual Amenity (including locally designated views)

Open Spaces

10.7.40. As outlined above, the Proposed Scheme is partially located within Crossness LNR and LBB open space policy designations. There are also several further areas of open space within the Study Area.

10.7.41. The operation phase of the Proposed Scheme will likely have some direct and indirect impacts on the setting and visual amenity of the users of the open spaces within the Study Area. Users of the open spaces will likely experience changes with views of the proposed built form. Due to the distance and intervening features such as existing roads, vegetation, and built form, the Proposed Scheme would likely occupy a very small portion of views from receptors in open space at longer distances from the Site Boundary such as Frank's Park and Lesnes Abbey Wood, with the two new Absorber Columns (inclusive of stacks) being the tallest features within views along with limited and periodic views of built form.

10.7.42. Users of open space in close proximity to the Site would likely have direct views of the Proposed Scheme. The views would likely have some impact on the visual amenity of the open space; however, they would be experienced in the context of the industrial nature of the townscape with several other developments of a similar nature and scale, including Riverside 1.

10.7.43. The sensitivity of the users of the open spaces is considered high due to the nature and purpose of enjoyment of the landscape, and the magnitude of impact, is considered moderate. Therefore, there is likely to be a direct and indirect, permanent, medium term to **moderate-large adverse (significant)** effect on the users of the open spaces within the Study Area, during the winter months at Year 1, prior to the implementation of additional mitigation measures.

10.7.44. Proposed planting will establish over time and that will help, to a small extent, integrate the Proposed Scheme into the landscape and partially screen views from some receptors. The magnitude of impact at Year 15, however, would remain moderate. Therefore, there is likely to be a permanent, long term **moderate-large adverse (significant)** effect on the users of open space at Year 15.

Public Rights of Way

Existing Baseline

10.7.45. There is the potential for the Proposed Scheme to have impacts on the PRoW network within the Study Area, some of which cross the Site.

10.7.46. The Proposed Scheme would likely have an adverse impact on the amenity experience of users of the PRoW, particularly those in close proximity to the Proposed Scheme where the existing open fields and vegetation of Crossness LNR form an element of the user's appreciation and experience. Users of the Thames Path (FP3) would also experience an impact close to the Proposed Scheme where the introduction of built structures would change views as the Proposed Jetty over the path would limit views of the river. The Proposed Scheme would be seen in the context of existing industrial uses including built form and existing jetties. The introduction of additional built form of the scale and nature proposed would not be entirely out of character with the baseline environment.

10.7.47. Users of PRoW beyond the immediate site, would experience an introduction of additional elements within views such as built form and the two new Absorber Columns (inclusive of stacks) but these would also be seen in the context of existing developments of a similar nature.

10.7.48. The demolition or retention of the Belvedere Power Station Jetty (disused) in the Proposed Scheme is not predicted to significantly change the assessment of impacts and effects for sensitive receptors (local PRoW) as the Proposed Jetty is considered to be similar in scale and form. Whilst the new gantry will be overhead and large in nature, it would be seen in the context of existing features of a similar nature and for a short duration along the PRoW. Should the disused jetty be retained in the emerging design the assessment will describe the qualitative change for affected receptors in respect to the visible components of each view, and consideration for the wider visual context.

10.7.49. The sensitivity of the users of the PRoW is considered medium as views of the surroundings are an important contributor to the enjoyment of the routes but set within an industrial character with similar scale developments nearby. The magnitude of impact is considered moderate. Therefore, there is likely to be a direct and an indirect, permanent, medium-term **moderate adverse (significant)** effect on the users of the PRoW within the Study Area, during the winter months at Year 1, prior to the implementation of mitigation measures.

10.7.50. Proposed planting will establish over time, which will likely partly screen views from the users of some PRoW within the Study Area, particularly close to the Proposed Scheme. The magnitude of impact at Year 15 would reduce to minor-moderate. Therefore, there is likely to be a permanent, long term **slight-moderate adverse (not significant)** effect on the users of PRoW at year 15.

Future Baseline

10.7.51. Users of PRoW within the Study Area would experience changes in views and experience of setting of the PRoW from the introduction of the Proposed Scheme. The experience of users of PRoW in close proximity to the Site, including those in Crossness LNR are likely to be materially impacted by the introduction of the new structures and associated stacks, while the users of the Thames Path (FP3) would in part be screened by the existing structures of Riverside 1, Riverside 2, and other existing buildings along the path. Users of PRoW beyond the Site, would experience an introduction of additional elements within views such as built form and the two new Absorber Columns (inclusive of stacks) but these would also be seen in the context of existing developments of a similar nature.

10.7.52. The sensitivity of the users of the PRoW is considered medium as views of the surroundings are an important contributor to the enjoyment of the routes but set within an industrial character with similar scale developments nearby. The magnitude of impact is considered minor-moderate. Therefore, there is likely to be a direct and an indirect, permanent, medium-term **slight-moderate adverse (not significant)** effect on the users of the PRoW within the Study Area, during the winter months at Year 1, prior to the implementation of mitigation measures.

10.7.53. Proposed planting will establish over time, which will likely partly screen views from the users of some PRoW within the Study Area, particularly close to the Proposed Scheme. The magnitude of impact at Year 15 would remain to minor-moderate. Therefore, there is likely to be a permanent, long term **slight-moderate adverse (not significant)** effect on the users of PRoW at Year 15.

Road Network

10.7.54. Within the Study Area, the Proposed Scheme would be visible from the A2016 Picardy Manorway/Eastern Way, Bronze Age Way, Yarnton Way, and from a network of minor and unclassified roads that cross the Study Area.

10.7.55. The Proposed Scheme will likely occupy a small portion of the view for users of the road network within the Study Area. Roadside vegetation that extends alongside the majority of potentially affected routes would screen views into the surrounding townscape. Whist glimpsed and periodic views of the Proposed Scheme would be tangible for these receptors their experience of the view will be transient in nature. There may be views of the taller elements of the Proposed Scheme above existing and proposed vegetation but would likely be limited to part of the buildings including the two new Absorber Columns (inclusive of stacks).

10.7.56. The sensitivity of the users of the roads within the Study Area is considered low as views of the surroundings are not an important contributor to appreciation and experience of the routes and the user's susceptibility to the type of development proposed is therefore considered to be low. The magnitude of impact is considered low. Therefore, there is likely to be an indirect, permanent, medium-term **slight adverse (not significant)** effect on the users of the roads within the Study Area, during the winter months at Year 1.

10.7.57. Proposed planting will establish over time, which will help further screen views from the users of the road network within the Study Area. The magnitude of impact at Year 15 would reduce to negligible. Therefore, there is likely to be a permanent, long term **neutral (not significant)** effect on the users of the road network at Year 15.

Residential

10.7.58. There is the potential for change in visual amenity from residential areas with views towards the Proposed Scheme and within the Study Area, including the new buildings and structures, fencing and lighting.

10.7.59. The Proposed Scheme would be visible to a varying degree from these residential receptors to the north, west, and south of the Proposed Scheme including the locally designated view within Belvedere to the south (VP6 – Thames River Valley Panorama).

10.7.60. Views from residential properties are largely limited to those on the edges of settlements orientated towards the Proposed Scheme and from those located on higher ground along the edges of the Study Area. The Proposed Scheme would likely have an adverse impact on the views from properties close to the Proposed Scheme and on higher ground to the south, however, distance, intervening vegetation and built form, as well as the presence of existing developments of a similar scale and nature within receptor views would limit this adverse impact.

10.7.61. The sensitivity of private residential receptors (people occupying their homes) is considered to be high due to the distance of the receptors from the Proposed Scheme and orientation and stationary nature of views, and the magnitude of impact is considered minor. Therefore, there is likely to be a direct, permanent, medium-term **slight-moderate adverse (not significant)** effect on residential receptors, during the winter months at Year 1.

10.7.62. The proposed planting will establish over time, however the distance of receptors from the Proposed Scheme and the scale and nature of the development mean the magnitude of impact is unlikely to change. The magnitude of impact at Year 15 would remain minor. Therefore, there is likely to be a permanent, long term, **slight-moderate adverse (not significant)** effect on the residential receptors at Year 15.

10.8. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION PHASE

10.8.1. The OCoCP will include any viable measures for avoidance, reduction, and mitigation of effects on townscape and visual amenity during construction. As such, no further mitigation measures are suggested for townscape and visual impact during construction beyond the measures outlined in **Section 10.6**.

OPERATION PHASE

10.8.2. The design of the Proposed Scheme is ongoing and will continue to be developed to deliver an optimised layout. Relevant design, mitigation and enhancement measures will be identified in the OLEMP and DAD for the Site west of the main operational area (the identified Mitigation Area), including consideration of the TVIA effects outlined in this chapter and as the ES develops, with opportunities taken to avoid, reduce and mitigate effects where possible.

10.8.3. The Applicant is also considering offsite improvements in the local area, including potentially in the areas shown in **Figure 7-7: Environmental Mitigation Opportunity Areas (Volume 2)**, which if brought forward would aim to achieve enhanced access and townscape outcomes in the area, in addition to ecological benefits.

10.9. MONITORING

10.9.1. The performance of embedded landscape mitigation measures and enhancement (particularly biodiversity net gain/habitat creation) will be monitored pursuant to an OLEMP.

10.10. RESIDUAL EFFECTS

10.10.1. **Table 10-7** below summarises the residual effects associated with the Proposed Scheme.

Table 10-7: Summary of Residual Effects

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Construction Phase				
Potential Effects on Townscape Character				
Change of character and vegetation cover within the Site	Site Character	**Large Adverse (significant)**	No further mitigation measures.	**Large Adverse (significant)**
Change in local townscape character (within 2km of the Site Boundary)	Townscape Character	**Slight-Moderate adverse (not significant)**	Stockpiles utilised to screen views of construction activities and light pollution where practicable.	**Slight-Moderate adverse (not significant)**
Potential Effects on Visual Amenity (including locally designated views)				
Change in character and visual amenity from open spaces	Open Spaces	**Large Adverse (significant)**	Stockpiles utilised to screen views of construction activities and light pollution where practicable	**Large Adverse (significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Change in visual amenity from the local PRoW network	PRoW	**Moderate Adverse (significant)**	Stockpiles utilised to screen views of construction activities and light pollution where practicable.	**Moderate Adverse (significant)**
Change in visual amenity from the local road network within 2km of the Site Boundary	Road Network	**Slight Adverse (not significant)**	Stockpiles utilised to screen views of construction activities and light pollution where practicable.	**Slight Adverse (not significant)**
Change in visual amenity from residential areas with views towards the Proposed Scheme and within the 2km Study Area	Residential	**Slight-Moderate adverse (not significant)**	Stockpiles utilised to screen views of construction activities and light pollution where practicable.	**Slight-Moderate adverse (not significant)**
Operational Phase				
Potential Effects on Townscape Character				
Change in Site character and vegetation cover – existing and future baseline	Site Character	**Moderate Adverse (significant) (Year 1)** **Moderate Adverse (significant) (Year 15)**	No additional mitigation beyond ongoing iterative design development and associated mitigation measures planned to be	**Moderate Adverse (significant) (Year 1)** **Moderate Adverse (significant) (Year 15)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
			identified in the OLEMP and DAD.	
Change in local townscape character (within 2km of the Site Boundary) – existing and future baseline	Townscape Character	**Slight-Moderate Adverse (not significant) (Year 1)** **Slight-Moderate Adverse (not significant) (Year 15)**	No additional mitigation beyond ongoing iterative design development and associated mitigation measures planned to be identified in the OLEMP and DAD.	**Slight-Moderate Adverse (not significant) (Year 1)** **Slight-Moderate Adverse (not significant) (Year 15)**
Potential Effects on Visual Amenity (including locally designated views)				
Change in character and visual amenity from Open spaces –existing and future baseline	Open Spaces	**Moderate-Large Adverse (significant) (Year 1)** **Moderate-Large Adverse (significant) (Year 15)**	No additional mitigation beyond ongoing iterative design development and associated mitigation measures planned to be identified in the OLEMP and DAD.	**Moderate-Large Adverse (significant) (Year 1)** **Moderate-Large Adverse (significant) (Year 15)**
Change in visual amenity from the local PRoW network –existing baseline	PRoW	**Moderate Adverse (significant) (Year 1)** **Slight-Moderate Adverse (not significant) (Year 15)**	No additional mitigation beyond ongoing iterative design development and associated mitigation measures planned to be	**Moderate Adverse (significant) (Year 1)** **Slight-Moderate Adverse (not significant) (Year 15)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
			identified in the OLEMP and DAD.	
Change in visual amenity from the local PRoW network – future baseline	PRoW	**Slight-Moderate Adverse (not significant) (Year 1)** **Slight-Moderate Adverse (not significant) (Year 15)**	No additional mitigation beyond ongoing iterative design development and associated mitigation measures planned to be identified in the OLEMP and DAD.	**Slight-Moderate adverse (not significant) (Year 1)** **Slight-Moderate Adverse (not significant) (Year 15)**
Change in visual amenity from the local road network within 2km of the Site Boundary –existing and future baseline	Road Network	**Slight Adverse (not significant) (Year 1)** **Neutral (not significant) (Year 15)**	No additional mitigation beyond ongoing iterative design development and associated mitigation measures planned to be identified in the OLEMP and DAD.	**Slight Adverse (not significant) (Year 1)** **Neutral (not significant) (Year 15)**
Change in visual amenity from residential areas with views towards the Proposed Scheme and within the 2km Study Area – existing and future baseline	Residential	**Slight-Moderate Adverse (not significant) (Year 1)** **Slight-Moderate Adverse (not significant) (Year 15)**	No additional mitigation beyond ongoing iterative design development and associated mitigation measures planned to be identified in the OLEMP and DAD.	**Slight-Moderate Adverse (not significant) (Year 1)** **Slight-Moderate Adverse (not significant) (Year 15)**

10.11. NEXT STEPS

10.11.1. Further work to be completed and included in the ES comprises:

- The TVIA will be further developed and refined based on any relevant responses to the Statutory Consultation.
- Winter walkover: A walkover including verified photography will be undertaken during the winter months of 2023 at the same visual receptor locations sampled in July 2023. Results from this walkover will be included in the ES.
- Digital ZTV will be updated based on the latest 3D Model of the Proposed Scheme that will be included in the ES.
- The detailed assessment within the ES will involve a review of the TVIA presented in this chapter, based on further information as part of ongoing design development.
- Preparation the AIA which will form a technical appendix to the in the ES.

10.12. LIMITATIONS AND ASSUMPTIONS

10.12.1. The following limitations and assumptions have been identified:

- The TVIA is based on, and limited to, the baseline conditions observed at the time of the walkover and additional desktop information. The walkover covered the summer months only.
- The prominence of the Proposed Scheme in the townscape and views will vary according to the prevailing weather conditions. The TVIA has been carried out, as is best practice, by assuming the 'worst-case' scenario i.e. on a clear, bright day in winter, when neither foreground deciduous foliage nor haze can interfere with the clarity of the view obtained.
- The assessment of operational effects assumes that disturbed areas not required for the operation of the Proposed Scheme (temporary tracks, laydown and working areas, excavations etc.) would be successfully reinstated to their original use following completion of the construction works. It is noted that these vegetation types may not necessarily comprise identical habitat types and value to those previously present.
- The limitations and technical specifications for production of Digital ZTV are included in **Figure 10-3: Visual Assessment Plan (Volume 2)**.
- The walkover has been undertaken from public roads, PRoW and open spaces. For residential receptors, assumptions have been made about the types of rooms in buildings and about the types and importance of views from these rooms. For there to be a visual effect, there is the need for a viewer and therefore only buildings that are in use have been considered in the visual assessment.

- The assessment of effects on visual receptors occupying buildings such as residences and public buildings includes consideration of potential for views from exterior areas associated with the building including gardens where appropriate. These effects are referenced where relevant.
- Subject to the assumptions made about the future baseline discussed in **Paragraphs 10.53.1** and **10.53.2**, the assessment reflects the baseline situation at the time of writing and therefore does not take account of any changes to the landscape fabric which may have taken place after this date.

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DECARBONISATION

CHAPTER 1: WATER ENVIRONMENT AND FLOOD RISK

Cory Decarbonisation Project

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11. WATER ENVIRONMENT AND FLOOD RISK

11.1. INTRODUCTION

11.1.1. This chapter reports the preliminary assessment of the likely significant effects of the Proposed Scheme on the water environment and flood risk during construction and operation and describes:

- relevant policy, legislation and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operational phase.

11.2. POLICY, LEGISLATION, AND GUIDANCE

11.2.1. The policy, legislation, and guidance relevant to the assessment of the water environment and flood risk for the Proposed Scheme is detailed in **Table 11-1**.

Table 11-1: Water Environment and Flood Risk Summary of Key Policy, Legislation, and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011[1]	Sets out the Government's policy for delivery of major energy infrastructure and is currently the primary basis for decision making on applications within the Planning Act 2008 regime. NPS EN-1 (paragraph 5.15.1) recognises that infrastructure can have adverse effects on the water environment. It states that the adverse impacts could lead to effects on health or on protected species and habitats and could result in surface waters, groundwaters or protected areas failing to meet environmental objectives established under the Water Framework Directive (WFD). Paragraph 5.15.2 states that where developments are "*likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of, the proposed project on water quality, water resources and physical characteristics of the water environment as part of the ES".* The ES should particularly describe existing quality of watercourses, existing water resources, existing physical characteristics of the water

Policy, Legislation or Guidance	Description
	environment and impacts on protected water bodies and areas (paragraph 5.15.3). Section 5.7: Flood Risk sets out that developments of 1 hectare or greater in Flood Zone 1 in England and all developments for energy projects located in Flood Zones 2 and 3 in England should be accompanied by a Flood Risk Assessment (FRA) (see paragraph 5.7.4). In determining an application for development consent, the SoS should be satisfied that, where relevant (Paragraphs 5.7.9 and 5.7.10): • *"The application is supported by an appropriate FRA;* • *The sequential test has been applied as part of site selection;* • *A sequential approach has been applied at the site level to minimise risk by directing the most vulnerable uses to areas of lowest flood risk;* • *The proposal is in line with any relevant national and local flood risk management strategy;* • *Priority has been given to the use of sustainable drainage systems (SuDS); and* • *In flood risk areas the project is appropriately flood resilient and resistant, including safe access and escape routes where required and that any residual risk can be safely managed over the lifetime of the development".* Section 5.15: Water Quality and Resources details that *"where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of, the proposed project on water quality, water resources and physical characteristics of the water environment as part of the ES or equivalent. The ES should in particular describe:* • *The existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges, proposed new discharges and proposed changes to discharges;* • *Existing water resources affected by the proposed project and the impacts of the proposed project on water resources, noting any relevant existing abstraction rates, proposed new abstraction rates and proposed changes to abstraction rates (including any impact on or use of mains*

Policy, Legislation or Guidance	Description
	supplies and reference to Catchment Abstraction Management Strategies); • *Existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project and any impact of physical modifications to these characteristics; and* • *Any impacts of the proposed project on water bodies or protected areas under the Water Framework Directive (WFD) and source protection zones (SPZs) around potable groundwater abstractions"* (paragraph 5.15.3).
Draft Overarching National Policy Statement (NPS) for Energy EN-1 2023[2]	This Draft Overarching National Policy Statement for Energy (EN-1) is part of a suite of draft NPSs issued by the Secretary of State of DESNZ. It sets out the government's policy for delivery of major energy infrastructure and will likely replace the 2011 NPSs by the time the application for the Proposed Scheme is submitted. For flood risk and water quality the draft is broadly similar to the 2011 document, and as such, specific paragraphs relevant to the assessment have not been reproduced here.
National Planning Policy Framework (NPPF) 2023[3]	The NPPF sets out the Government's planning policies for England and how these should be applied, with the following paragraphs relating to the water environment. Section 14 of the NPPF (paragraphs 159-169) details the requirements for FRA. An FRA will be prepared to support the DCO application for the Proposed Scheme. In accordance with the NPPF, the FRA will assess the potential impacts of flooding on, and because of, the Proposed Scheme and ensure that the Proposed Scheme is sequentially appropriate, which may require an exception test.
The London Plan 2021[4]	The Spatial Development Strategy for Greater London setting out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policies SI12 to SI14 detail how the Proposed Scheme will need to take into consideration the local flood risk within and surrounding the Site and use sustainable drainage systems and highlight the importance and strategic role of the River Thames.

Policy, Legislation or Guidance	Description
The Bexley Local Plan 2023[5]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development across the Borough, including measures to address water supply and quality, flood risk and effects of climate change, amongst others. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. The Local Plan details the flood risk management considerations for developments in: • Policy DP18: Waterfront development and development including, or close to flood defences – requiring development to protect and enhance the water space; • Policy DP19: The River Thames and the Thames Policy Area - sets out the development management considerations that relate to the nature conservation and quality of the River Thames; • Policy DP29: Water quality, supply and treatment – addressing quality of the water environment, impacts on the water supply and wastewater/sewage infrastructure and impacts on sensitive development from Crossness Sewage Treatment Works; • Policy DP32: Flood risk management – establishing the approach to managing flood risk through new and re-development opportunities in the area; • Policy DP33: Sustainable drainage systems – outlining the approach to managing sustainable drainage systems through development proposals; and • SP13: Protecting and enhancing water supply and wastewater infrastructure.
London Environment Strategy 2018[6]	The London Environment Strategy seeks to ensure that London will become a "*zero carbon city by 2050*" by setting out policies and proposals in seven policy areas to address environmental challenges, including the transition to a low carbon circular economy. The London Environment Strategy contains the aim to ensure that relate to the water environment: *"Reduce risks and impacts of flooding in London on people and property and improve water quality in London's rivers and waterways".*

Policy, Legislation or Guidance	Description
Bexley Strategic Flood Risk Assessment Level-1 2019[7]	The purpose of the Level 1 Bexley Strategic Flood Risk Assessment (SFRA) was to collate and analyse the most up to date readily available flood risk information for all sources of flooding and provide an overview of the flood risk issues across Bexley. The Level 1 SFRA identifies several designated main rivers within the Site under the jurisdiction of the Environment Agency and that the Site is protected by flood defences located along the River Thames.
Bexley Strategic Flood Risk Assessment Level-2 2020[8]	The Level 2 Bexley SFRA provides evidence to support exception tests. The purpose of the Level 2 SFRA is to ensure that proposed developments which need to be located in areas at risk of flooding, are supported by an exception test showing how flood risk will be managed.
Bexley Local Flood Risk Management Strategy 2017[9]	The Local Flood Risk Management Strategy sets of the processes and procedures for managing surface water, groundwater and ordinary watercourse flooding in the Borough.
Charlton to Bexley Riverside Integrated Water Management Strategy 2017[10]	The Charlton to Bexley Riverside Integrated Water Management Strategy sets out the framework to support proposed development whilst avoiding sewer and surface water flooding and increasing water supply security in a sustainable manner. The Strategy also includes Thames Water's plan for addressing the forecast deficit in the London Water Resource Zone through a combination of measures to tackle leakage, manage and reduce water demand, and install new water supply schemes.
South East Inshore Marine Plan 2021[11]	The South East Inshore Marine Plan area stretches from Felixstowe in Suffolk to west of Dover in Kent and incorporates the River Thames. The South East Inshore Marine Plan will help to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan area. Policy SE-CC-2 states that "*proposals in the South East Marine Plan area should demonstrate for the lifetime of the project that they are resilient to the impacts of climate change and coastal change*". In addition, Policy SE-CC-1 advises that proposals must demonstrate that they will avoid, minimise or mitigate any significant adverse impacts on existing activities.

Policy, Legislation or Guidance	Description
The Thames River Basin District Action Management Plan 2022[12]	The Thames River Basin District (RBD) River Basin Management Plan describes the challenges that threaten the water environment and how these challenges can be managed.
Legislation	
Flood and Water Management Act 2010[13]	The Flood and Water Management Act created the role of the LLFA to take responsibility for leading the co-ordination of local flood risk management in their areas. In accordance with the Act: • The Environment Agency is responsible for the management of risks associated with main rivers (such as the River Thames), the sea and reservoirs; and • LLFAs are responsible for the management of risks associated with local sources of flooding such as ordinary watercourses, surface water and groundwater. LBB is the Lead Local Flood Authority (LLFA) for the Site. Schedule 3 of the Act, which is due to be implemented in 2024, does not apply to NSIPs, however the LLFA will be consulted on the preparation of the Outline Drainage Strategy, as it is likely that the similar principles will need to apply.
The Environmental Permitting (England and Wales) 2016 as amended by the Environmental Permitting (England and Wales) (Amendment) (EU Exit) Regulations 2018[14]	Under the Environmental Permitting Regulations, it is an offence to cause or knowingly permit a water discharge activity, including the discharge of polluting materials to freshwater, coastal waters, relevant territorial waters or groundwater, unless complying with an exemption or an environmental permit (obtained from the Environment Agency). The Environment Agency sets conditions which may control volumes and concentrations of particular substances or impose broader controls on the nature of the effluent, taking into account any relevant water quality standards from EU directives. The Environmental Permitting Regulations also manage works that have the potential to affect a watercourse under the jurisdiction of the Environment Agency. Any works in, under or near a main river require permission from the Environment Agency to ensure no detrimental impacts on the watercourse (although this can be 'rolled up' into a DCO). There are several designated main rivers located within the Site.

Policy, Legislation or Guidance	Description
Land Drainage Act 1991[15]	LLFA and Internal Drainage Boards (IDB) have additional duties and powers associated with the management of flood risk under the Land Drainage Act. Consent must be given for any permanent or temporary works that could affect the flow within an ordinary watercourse under their jurisdiction to ensure that local flood risk is not increased (although this can be 'rolled up' into a DCO). The Land Drainage Act also sets out the maintenance responsibilities of riparian owners to reduce local flood risk.
The Water Environment (Water Framework Directive) (England and Wales) Regulations (the 'Water Framework Regulations') (2017)[16]	The WFD (2000/60/EC) establishes a framework for the management and protection of Europe's water resources. It was implemented in England and Wales through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (as amended). The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (as amended) has subsequently been revoked and replaced by the Water Framework Regulations. The Water Framework Regulations aim to prevent deterioration of the water environment and improve water quality by managing water in natural river basin districts and through the protection of groundwater against pollution. The Regulations impose duties on the Secretary of State and the Environment Agency to ensure compliance with the EU Directive 2000/60/EC, in particular when deciding whether to grant, vary or revoke certain permits and licences which affect water quality. Part 2 of the Regulations requires the identification of river basin districts and assessments to be carried out by the Environment Agency to characterise and classify the status of water bodies in those districts and assess the economic aspects of water use. River Basin Management Plans must be established for each river basin district. Part 3 of the Regulations makes provision for certain protected areas, includes requires the identification of bodies of water from which drinking water is abstracted, and specific measures are specified that must be included in a programme of measures to protect the quality of the water.

Policy, Legislation or Guidance	Description
The Water Resources Act 1991[17]	The Water Resources Act aims to regulate water resources, water quality and pollution and flood defences within the UK to minimise pollution of water. Part II of the Act deals with the management of water resources. This includes the licences required to abstract and impound controlled water. These licences are regulated by the Environment Agency. Part III of the Act addressed the control of water pollution, including the discharge consent system and water pollution offences, regulated by the Environment Agency. However, the Environmental Permitting Regulations currently define the regime on water discharge permits. Part IV deals with flood defences and Part VII deals with anti-pollution works and works notices. A works notice can be served on anyone that causes or knowingly permits a pollutant to enter controlled waters.
The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 (as amended)[18]	The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 apply in England and in specified marine waters and the seabed. They specify the types of damage to a protected species or natural habitat, a site of special scientific interest, water or land which constitute "*environmental damage*" for the purposes of the regulations and the types of activity causing environmental damage to which the regulations apply. There are certain exemptions and exclusions from the application of the regulations. The Regulations also specify the authorities whose function it is to enforce the regulations. Environmental damage to groundwater means any damage to a body of groundwater such that its conductivity, level or concentration of pollutants changes sufficiently to lower its status for the purposes of Directive 2000/60/EC and in relation to pollutants, for the purposes of Directive 2006/118/EC of the European Parliament and of the Council on the protection of groundwater against pollution and deterioration, whether or not the body of groundwater is in fact reclassified as being of lower status.
The Water Industry Act 1991[19]	The Water Industry Act sets out the main powers and duties of the water and sewerage companies. This replaces those set out in the Water Act 1989 and defines the powers of the Director General of Water Services (now known as the Water Services Regulation Authority (Ofwat)).

Policy, Legislation or Guidance	Description
The Water Act 2003[20]	The Water Act is an update to the Water Resources Act 1991 and the Water Industry Act 1991 and aims to provide a modern, efficient and robust legislative framework to facilitate both sustainable water resources management and economic growth through the new provisions it contains. It is relevant to the Proposed Scheme due to its legislative power in ensuring the protection of controlled waters within the Site, water conservation and flood defences.
The Water Act 2014[21]	The Water Act 2014 is an update to the Water Resources Act 1991, the Water Industry Act 1991 and the Water Act 2003, which enables greater competition for non-household customers and gives Ofwat new powers to make rules about charges and charging schemes, as well as making provisions for flood insurance and drainage boards. It is relevant for the Proposed Scheme due to its legislative power in ensuring the protection of controlled waters within the Site and in relation to licences to abstract water and specifically the purchase of potable water.
The Groundwater (Water Framework Directive) (England) Direction 2016[22]	The Groundwater Direction instructs the Environment Agency on obligations to protect groundwater (water found below the surface), updating requirements including: • the monitoring and setting of thresholds for pollutants in groundwater; • adding new pollutants to the list of pollutants to be monitored; and • changing the information to be reported to the European Commission. The Groundwater (Water Framework Directive) (England) Direction 2016 revokes and replaces the Groundwater (Water Framework Directive) (England) Direction 2014.
Environment Act 2021[23]	The Environment Act makes provision about targets, plans and policies for improving the natural environment. Part 5 of the Act focuses on protection of the water environment and contains several important subsections on this topic relevant to developers.

Policy, Legislation or Guidance	Description
Guidance	
National Planning Practice Guidance (NPPG) (2021)[24]	Guidance relevant to the planning system in England. Relevant to this assessment, the NPPG advises how to take account of and address the risks associated with flooding and coastal change in the planning process.
Guidance for Pollution Prevention (GPP)[25] and will replace the Pollution Prevention Guidelines (PPG)[26]	The GPP are currently being developed and published to provide environmental good practice for the whole of the UK. GPP will replace the Pollution Prevention Guidelines (PPG) published by the Environment Agency, which have been withdrawn. Where they have not yet been replaced, the PPG still provide good practice advice.

11.3. SCOPING OPINION AND CONSULTATION

11.3.1. An EIA Scoping Opinion[27] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26th May 2023. The responses from the Planning Inspectorate and statutory consultees in relation to the water environment and flood risk and how these requirements will be addressed by the Applicant are set out in **Table 11-2** below.

Table 11-2: Summary of the EIA Scoping Opinion in Relation to the Water Environment and Flood Risk

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Planning Inspectorate			
3.7.1	Water Framework Directive (WFD) Groundwater Bodies	*"The Scoping Report indicates that there is one WFD surface water body within the study area, which falls within a management (but not operational) catchment. The Scoping Report does not make reference to any WFD groundwater bodies within the study area, despite Table 10-5 noting that groundwater quality is to be scoped in. The ES and/ or accompanying WFD assessment should include any relevant groundwater bodies."*	The Greenwich Tertiaries and Chalk Water Body WFD Groundwater Body (GB40602G602500) is the only WFD groundwater body located within the Study Area and will be assessed within the WFD assessment. Information on the Greenwich Tertiaries and Chalk Water Body WFD Groundwater Body is included in this technical chapter and will be included within the ES.
3.7.2	Requirement to assess geomorphology and other physical marine processes	*"The Inspectorate notes that the Scoping Report does not specifically refer to geomorphology or marine physical processes with the exception of the sediment transport regime, instead referring to "coastal processes". The Inspectorate considers it is appropriate to provide an assessment of these effects within the ES, due to the construction and operation of a permanent jetty and the dredging works*	**Direct morphological change and hydrodynamic regime:** Changes to the estuary morphology and hydrodynamics will be assessed within the ES. This includes effects associated with capital dredging (construction phase) and maintenance dredging (operation phase). **Sediment transport processes and water quality:** Sediment transport modelling will be assessed within the ES. This includes erosion, deposition/ accretion bed levels and suspended

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		which form part of the Proposed Development description. *The Inspectorate considers that the following matters are required to be scoped into the ES where significant effects are likely to occur during construction and/ or operation:* • *Direct morphological change from the presence of the marine infrastructure and any associated dredging works, including any identified riverbed restoration works;* • *Changes to the hydrodynamic regime;* • *Changes to sediment transport processes (including erosion, deposition/ accretion and scour from vessel movements);* • *Changes to water and sediment quality (including suspended sediment concentrations and contaminants); and* • *Changes to wave climate (including both wind waves and vessel generated waves).* *The ES should identify where geomorphological changes could impact on other relevant aspect topics."*	sediment concentrations during the construction and operation phases. Particle tracking will also be undertaken to understand the sediment dispersion and suspended sediment concentrations due to the proposed capital dredging activities. **Changes to wave climate:** A high level review of the resulting wind and vessel generated waves and risk of scour will be undertaken based on expert opinion, noting that the estuary is fetch limited and ship wake from the Proposed Scheme is considered to be minimal compared to current shipping activities. These assessments will be set out in the ES.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.7.3	Groundwater Quality – Operation	*"The Scoping Report seeks to scope out groundwater quality during operation due to the anticipated implementation of standard mitigation measures and controls. However, the Scoping Report acknowledges that there is a risk to surface water during operation due to an increased pollution risk from the new potential sources introduced (use and storage of chemicals and hazardous wastes etc). The Inspectorate considers that this risk may also be applicable to groundwater, and therefore is not in agreement that this can be scoped out of the assessment."*	As design development is ongoing assessment of risk to groundwater quality has been included in this technical chapter and will be included within the ES for both the construction phase and operation phase.
3.7.4	WFD screening assessment for water bodies which are not WFD designated – construction and operation	*"The Inspectorate is in agreement that a WFD screening assessment is not required for non WFD (undesignated) water bodies. However, the ES should consider whether any of the biological, physio-chemical and hydromorphological parameters are to be assessed under general surface water/ groundwater quality as per the first two lines of Table 10-5."*	The ES will include an assessment of the effects of the Proposed Scheme on the biological, physico-chemical and hydromorphological quality elements of the non WFD designated watercourses (shown in **Figure 11-1: Surface Water Features (Volume 2)**) as outlined in Table 10-5 of the EIA Scoping Report[28].

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.7.5	Flood associated groundwater and groundwater flooding risk – construction and operation	*"The Scoping Report proposes to scope out flood associated groundwater and groundwater flooding risk during construction and operation, based on the Proposed Development being unlikely to increase the risk of groundwater flooding and the absence of any planned large excavations.* *The Inspectorate notes comments from the London Borough of Bexley (Appendix 2 of this Opinion), which state that the marshland nature of the site can result in unexpected flooding from groundwater, and from the interaction of groundwater with other sources. In view of this, together with the absence of defined locations of principal development components within the application site, the Inspectorate is not in a position to scope out this matter.* *The ES should assess impacts from flood associated groundwater and groundwater flooding risk, during construction and operation, where significant effects are likely to occur."*	As design development is ongoing assessment of groundwater flood risk has been included in this technical chapter and will be included within the ES for both the construction phase and operation phase.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.7.6	Impacts to groundwater associated users – construction and operation	*"Based on the distance from the site to the mapped/ licenced abstractions, and intervening land uses, the Inspectorate is in agreement that an assessment of licenced water abstractions can be scoped out of the assessment.* *However, the Scoping Report proposes that the ES will obtain information on private and unlicenced abstractions. The ES should describe any potential impacts on private and unlicenced abstractions and provide an assessment of any likely significant effects."*	Data received from the LLFA and Environment Agency since the EIA Scoping Report[28] was prepared confirms that they do not hold any data/information on the presence of private or unlicenced groundwater abstractions within the Study Area. Therefore, impacts to private and unlicenced groundwater associated users during construction and operation are considered likely to be insignificant on the presumption of absence of unlicenced abstractions (as described in **Section 11.4**).
3.7.7	Springs – construction and operation	*"Based on the absence of any known springs within the study area, the Inspectorate is in agreement that an assessment of springs can be scoped out of the assessment."*	No response required.
3.7.8	Groundwater Dependent Terrestrial Ecosystems (GWDTE's) – construction and operation	*"Based on the absence of any GWDTEs, the Inspectorate is in agreement that an assessment of GWDTE can be scoped out of the assessment."*	No response required.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.7.9	Baseline Environment	*"It is noted that there are discrepancies in baseline information presented within this chapter, specifically in relation to flood risk zones. The ES should present the baseline information in a consistent manner with reference to all available sources."*	Engagement and consultation is currently being undertaken with the Environment Agency, which will provide more detailed information in relation to the local flood risk and flood zones. Although engagement remains ongoing, the latest and most refined flood risk data for the Site is the Environment Agency's 2018 Thames Estuary Breach Assessment[29]. This information will be presented in the FRA and ES. Reference to the other available sources will be included where appropriate.
3.7.10	Previous removal of mapped watercourse	*"The Scoping Report indicates that the construction of Riverside 1 required the removal of a watercourse that is currently shown on flood risk mapping. The ES should clarify, where known, the diversion route of this waterbody, and confirm how this is to be assessed within the ES if it is not shown on existing mapping."*	The Environment Agency's Long Term Risk of Flooding from Surface Water Map[30] shows flooding to the east of Riverside 1 (to the east of the Site Boundary). Aerial imagery taken prior to its construction appears to show a watercourse (essentially a stub end of OW4 (shown in **Figure 11-1: Surface Water Features (Volume 2)**). It is likely that the associated groundworks infilled this and it was replaced with elements of the Outline Drainage Strategy for Riverside 1, which in turn discharges into OW4, in a very similar manner, north of the Site Boundary. Thus, no further assessment is considered to be required. All

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			existing watercourses on site are mapped on **Figure 11-1: Surface Water Features (Volume 2)**.
3.7.11	Published mapping	*"The Scoping Report considers that the available mapping from 2013 is not representative of current flood risk. The ES should detail how this is to be considered within the ES and accompanying Flood Risk Assessment."*	As detailed in the response to 3.7.9, post submission of the ES Scoping Report, the Environment Agency has confirmed that the 2018 Thames Estuary Breach Assessment is the best available data for the area. This updated information will be presented in the FRA and ES.
3.7.12	Groundwater Study Area	*"The ES should include a justification for why the groundwater study area is 2km within this chapter and 1km within the ground conditions and soils chapter."*	Considering the complexity of ground resources (i.e. groundwater bodies) a Study Area (2km) is considered appropriate for the purpose of assessing any potential risk (groundwater quality and quantity) to groundwater receptors on a water body scale. The Study Area for **Chapter 17: Ground Conditions and Soils (Volume 1)** is 1km for controlled water receptors. This is considered appropriate for indirect effects from potential offsite sources of contamination based on the specifics of the Study Area such as the underlying geology (composition and permeability for example), an appreciation of the water environment and previous land use.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.7.13	Coastal processes Study Area	*"The Scoping Report states that the study area for coastal processes is the site boundary; however this will be reviewed as a result of coastal modelling.* *The Inspectorate considers that a wider study area should be considered given the potential for the construction and operational works to mobilise sediments and affect other receptors off site as detailed in paragraph 10.8.11 of the Scoping Report, which refers to the coastal modelling over a larger area.* *The ES should detail the selected methodology for coastal modelling, including a justification for the use of either qualitative or quantitative modelling methods. The Applicant's attention is drawn to the Environment Agency's scoping consultation response in this regard (Appendix 2 of this Opinion). The Applicant should make effort to agree the approach to coastal modelling with relevant consultation bodies including the Environment Agency."*	The coastal processes assessment including numerical modelling which will be presented in the ES will consider the Thames Estuary from Coryton to the tidal limit at Richmond. A detailed description of changes will be presented with a higher level of resolution applied over the immediate Site. Consultation and engagement with the Environment Agency are currently ongoing to confirm the approach to the numerical modelling.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.7.14	Sensitive Receptors	*"Thames Water have identified that the Proposed Development is located within the Riverside Water Flow Monitoring Zone (FMZ), where there is concern over having sufficient water supply to meet future growth. The Inspectorate considers that the FMZ should be included within the list of sensitive receptors to be assessed. Any assessment of this or other impacts related to water supply should have reference to the relevant local plans or other local planning documents (such as the London Plan identification of opportunity areas and the Riverside growth study)."*	As detailed in the Charlton to Bexley Riverside Integrated Water Management Strategy[10] Thames Water has developed a plan for addressing the forecast deficit in the London Water Resource Zone through a combination of measures to tackle leakage, manage and reduce water demand, and install new water supply schemes. The plan is reliant on significant demand reduction measures from existing property and highlights the need for new developments to minimise water use and help identify innovative solutions to delivering alternative supplies. **Chapter 2: Project Scheme and Site Description (Volume 1)** and **Chapter 3: Consideration of Alternatives (Volume 1)** provide a description of the water usage requirements for the Proposed Scheme, demonstrating that measures to minimise potable water use (including innovative solutions such as water recycling) are incorporated. Therefore, it is considered that relevant strategy/policy requirements are met and that impacts to potable water demand during construction and operation are likely to be insignificant (as described in **Section 11.4**). Furthermore, Thames Water (as the statutory water

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			undertaker) is currently determining if there is sufficient capacity within the water supply system to be able to supply the required potable water for the Proposed Scheme. Consequently, there is no requirement to consider the potable water demand further in this assessment.
3.7.15	Mitigation – wastewater treatment	*"The Scoping Report states that "wastewater" will be treated at a wastewater plant. However, wastewater is not defined, and could refer to sewage, surface water, trade effluent / process water etc. The ES should clarify this terminology and ensure to clearly describe the disposal/ run off methodology for any type of water to be discharged from the Proposed Development.* *In relation to this, the Scoping Report states that water that is to be discharged to the existing water environment will meet the relevant Environmental Quality Standards (EQS). The ES should also consider how the discharged wastewater would be able to comply with any required environmental permits or other discharge consents in the event that the permitted limits within these*	**Chapter 2: Project Scheme and Site Description (Volume 1) Paragraphs 2.2.57** to **2.2.60** provides a description of the types of wastewater generated by the Proposed Scheme and how it will be treated. Appropriate mitigation is being considered as part of ongoing design evolution and will be presented within the ES, such mitigation will include environmental permits or other discharge consents where appropriate.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		are lower than the EQS."	
3.7.16	Site specific surface and groundwater monitoring data	*"The Scoping Report states that for the authoring of the ES, no quantitative assessment or site-specific ground investigation will be undertaken. The ES should confirm if these are to be undertaken at any point of the design, construction or operation of the Proposed Development, and how the baseline can be sufficiently defined without this information."*	No additional ground investigation works will be undertaken to acquire further baseline information and data to support the application for development consent in respect of water receptors. A ground investigation is proposed to be undertaken as part of the detailed design of the Proposed Scheme. Previous and historical ground investigation data, for various areas of the Site is available. Data from these previous and historical ground investigations has will be considered within the ES.
3.7.17	Potable water supply and other water sources	*"As noted above, the current water supply for the Proposed Development is not yet known. The Scoping Report provides an assumption that a potable water supply beyond welfare is not needed. The ES should assess the potential for effects on groundwater or surface water quality and quantity resulting from the water supply options which form part of the Proposed Development."*	Details on the water supply options and requirements are provided in **Chapter 2: Project Scheme and Site Description (Volume 1)** and **Chapter 3: Consideration of Alternatives (Volume 1)**. The feed water supply will likely use a combination of potable water from Thames Water (Water Supply Zone: 0105) and recycled effluent from the Carbon Capture Facility. The design of the Carbon Capture Facility has included water recycling where practicable, to minimise potable water demand and wastewater generation from the Carbon Capture Facility.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			Therefore, impacts on groundwater or surface water quality and quantity resulting from the water supply options during construction and operation are considered likely to be insignificant (as described in **Section 11.4**).
3.7.18	Clarity of assessment scope	*"The Inspectorate notes that similar receptors and potential effects are to be assessed in both this chapter and the geology and soils chapter. The ES should define the scope of assessment in each of these chapters and provide clear cross reference to where the relevant assessments are presented."*	Although some inherent cross-over exists between **Chapter 17: Ground Conditions and Soils (Volume 1)** and **Chapter 11: Water Environment and Flood Risk (Volume 1)** the assessment of risks are different. **Chapter 17: Ground Conditions and Soils (Volume 1)** assesses contamination risks (existing and/or potential to create from development activities) to controlled waters (locally). Whereas this technical chapter provides an assessment from a groundwater resources (quantity and quality) and waterbody perspective. Therefore, risks and impacts to groundwater receptors from the Proposed Scheme is assessed at a local scale (i.e. groundwater flow and level) and regional scale (i.e. source protection zone) within this technical chapter.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Environment Agency			
Geomorphology	-	*"We query as to whether sediment deposition should be scoped out? Whilst the statement relates to the operational activities of boats etc, there is potentially going to be some geomorphological changes associated with the construction of the new pier. This new permanent structure will potentially cause changes to accretion and deposition locally, so unless the extent and rate of any sediment deposition is assessed, then it shouldn't be scoped out at this stage.* *Unless the Proposed Jetty is identical to the existing structure, the replacement/Proposed Jetty and any dredge pocket will need hydrodynamic modelling to understand the impact on:* • *Tidal currents;* • *Wind waves; and* • *Wave wash from vessels using the jetty (wake) or passing nearby.*	This technical chapter outlines the assessment of the sediment transport regime (coastal processes) during both the construction and operation phases, which will be considered within the ES. This technical chapter provides the methodology for the assessment in **Section 11.4**. The assessment will be provided in a Coastal Modelling and Sediment Processes Report which will form a technical appendix to Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES and summarise the hydrodynamic modelling (undertaken in a 2D model with flexible mesh in 'MIKE' by DHI) to understand the impact on: tidal currents; sediment dispersion, sediment transport. The technical appendix will also include an assessment of the impacts of ship/wave wash from vessels using the jetty (wake) and associated impacts on sea bed scour (as a result of propeller/jet action). The assessment will not include either the impacts of ship wake resulting from passing vessels (which are part of the baseline scenario) or wind waves (given the limited/negligible fetch length).

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			Chapter 2: Site and Proposed Scheme Description (Volume 1) includes a description of the Proposed Jetty. Further information relating to the design of the Proposed Jetty, refinement of its location and the extent of the dredge pocket required will be included in the ES. The effects of wave wash (from wind and vessels) are assessed in **Section 8.8** of **Chapter 8: Marine Biodiversity (Volume 1)**. The assessment will also be considered within the ES.
Water Quality	-	*"In general we feel that water quality potential concerns have been correctly identified and we are confident that Water Framework Directive (WFD) water quality compliance will be fully considered within appropriate impact assessments that should follow once more appropriate data has been gathered. The report states that they are proposing to scope in water quality for an "impact assessment" which we support. We do not support the qualifying phrase Scoped in as a precaution_ pending design options as leaves room for the design options to allow water quality to be "scope out" later. If any dredging or piling is undertaken, then*	The scope of the water quality effects assessed is detailed within **Section 11.4**, which accords with the Environment Agency's request and is sufficient to account for the different design options being considered. The assessment will also be considered within the ES based on the Proposed Scheme as described at that time. With regards to the WFD impact assessment the Applicant will include this as a technical appendix to Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES, thereby being presented as a standalone document.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		the proposal will not be able to "scope out" those activities. We would prefer the final WFD impact assessment to be a standalone document (for ease of comment without the need to cross-reference to larger documents where facts may be embedded in large chapters).	
Specific Comments 2.2.36.	-	*"Abstraction from the Thames will require an abstraction licence. The WFD impact of abstraction of water on Thames Middle waterbody will need to be considered. Whilst the impact might be anticipated to be relatively small scale in terms of the proportional volume of Thames Middle (so may "impact assess" as WFD compliant when fully considered in relation to WFD water quality), the flow in the Thames is very seasonally variable. Summer droughts (and abstraction in the freshwater reaches for public supply) can severely limit the freshwater flows. Should any of this water be returned to the river as post process water (effluent) we note that it will need to conform to the relevant EQS limits. Any thermally elevated (relative to natural*	The Proposed Scheme will not require a new abstraction licence. It is intended that the water supply for the Carbon Capture Facility will use a combination of potable water from Thames Water (Water Supply Zone: 0105) and recycled effluent from the Carbon Capture Facility. In additon, there will be a new potable water connection for the Ancillary Infrastructure in Thame Water's water main, located within the southern area of Norman Road. Further information on the water supply for the Proposed Scheme is presented in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**. Extreme temperatures events and droughts are assessed in **Chapter 12: Climate Resilience (Volume 1)**. The assessment will be updated and presented in the ES.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		riverine temperature) discharges will require an assessment of potential impacts on physico-chemical water quality."	The WFD impact assessment will be presented as a technical appendix to Chapter 8: Marine Biodiversity (Volume 1) of the ES. The WFD impact assessment will consider the Thames Middle Water Body and the Greenwich Tertiaries and Chalk Groundwater Body. Further information on these waterbodies is presented in this technical chapter. **Chapter 2: Project Scheme and Site Description (Volume 1)** provides a description of the types of wastewater and how wastewater will be generated and treated as part of the Proposed Scheme. Appropriate mitigation is being considered as part of ongoing design evolution and will be presented within the ES, such mitigation will include environmental permits or other discharge consents where appropriate.
Flood Risk and Coastal Processes	-	*"We welcome the other Impacts being Scoped in but believe that additional topics should be Included and Scoped in as follows:* • *The offset between the new structures horizontally and vertically relative to the Thames Tidal Defences.*	The design of the Proposed Scheme has and will continue to take into consideration the flood risk as detailed throughout this technical chapter and as will be explained in the FRA. As detailed within **Section 11.4** the following sensitive receptors, in addition to others, have been considered in this preliminary assessment:

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		• *The impact on the Thames Tidal Flood defences, as well as the ability to uprate, maintain and if needed replace those structures in the future.* • *Any displacement of fluvial floodplain.* • *Works in close proximity to, or impacting, a fluvial watercourse.* • *The potential impact on the Thames Tidal Defences of the demolition of the existing derelict Belvedere Power Station Jetty, and how that will be mitigated."*	• Waterbodies (i.e. the River Thames, Marsh Dykes and Ponds); • Floodplain (associated with a breach of the River Thames flood defences); and • Floodplain (associated with Marsh Dykes). The Proposed Jetty will be designed in such a manner that the River Thames flood defences could be raised in the future as part of the Thames Estuary 2100 Plan[31]. The demolition, if undertaken, of the Belvedere Power Station Jetty (disused) will not impact the River Thames flood defences as the works to remove the jetty would also include restoring the defences to an appropriate level as determined through ongoing consultation with the Environment Agency.
Flood Risk and Coastal Processes 10.8.2.	-	*"Design Manual for Roads and Bridges (DMRB) LA 113 – Road Drainage and the Water Environment considers the current receptors only, but this may change in the future during the proposed scheme. The Applicant could alternatively consider the source-pathway receptor model in the context of tidal flooding to ensure that the*	As detailed in **Section 11.4** the preliminary assessment for both the construction and operation of the Proposed Scheme has been undertaken following the principles set out within the DMRB LA 113. Although not directly applicable to the nature of the Proposed Scheme, the DMRB guidance provides a good basis for assessing effects of

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		flood risk is adequately managed e.g., by providing fit-for-purpose defences which mitigates the pathway to the receptor."	developments on the water environment and flood risk. With regards to future receptors the preliminary assessment, and the assessment that will be presented in the ES, considers the future baseline, including Riverside 2. Further information on the future baseline with regards to water environment and flood risk is provided in **Section 11.6**.
Flood Risk and Coastal Processes	-	*"Sediment Transport Regime – We note that this impact is described in terms of this localised section of the River Thames. The area of interest should not be drawn too narrowly."*	As described in **Section 11.5** the Study Area for the coastal processes model (sediment transport) is broad and covers the reach of the Thames between Richmond (approximately 32km west of the Site Boundary) and Coryton (approximately 27km east of the Site Boundary). A higher level of model resolution (approximately 1km) has been defined over the immediate project frontage to capture the Proposed Scheme design changes.
Flood Risk and Coastal Processes	-	*"We disagree with the categorization of significance set out in table 10-7, which appears to somewhat trivialise impacts. Adverse impacts on water and flood risk infrastructure are unacceptable, as is creating any increase in peak flood levels. Even small increases in peak water levels in*	It is acknowledged that any magnitude of impact on the water environment and flood risk could be perceived as unacceptable or significant. For the purposes of this assessment significance has been undertaken using the principles set out within the DMRB LA 113. Although not directly applicable to the nature of the Proposed Scheme, the DMRB

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		combination with other developments can have a cumulative effect and thus must be prevented and necessary opposed."	guidance provides a good basis for assessing effects of developments on the water environment and flood risk. Further information on the significance criteria is provided in **Section 11.4**. Additionally, the ES will consider cumulative impacts further to **Chapter 21: Cumulative Effects (Volume 1)** of this PEIR.
Coastal Processes 10.8.12.	-	*"We disagree with the proposed approach to assessing the impact of the in-channel works on sediment movement in the River Thames. Detailed quantitative sediment transport modelling should be carried out. That should include assessing the cumulative effects with the existing jetty and also with other nearby in-channel structures. The former sediment study that was undertaken for Middleton Jetty should be provided and compared to the changes that have taken place since that jetty was constructed."*	It is proposed that a detailed hydrodynamic site-specific modelling study will be undertaken in the "MIKE by DHI" software package to establish the sensitivity and magnitude of any changes to the hydrodynamics (coastal processes) of the River Thames during the construction and operation phase of the Proposed Scheme. Engagement to reach agreement on the modelling approach is currently being undertaken with the Environment Agency and the PLA as described in **Section 11.3**. The results of the detailed study will be presented in the ES.
Coastal Processes	-	*"Mitigation measures to address the risks to flood defence infrastructure, outfalls and the river habitats associated with scour and sediment accretion should be proposed, along with a contingency plan and trigger*	**Section 11.7** and **Section 11.9** of this technical chapter outline the preliminary embedded and additional design, mitigation and enhancement measures for the Proposed Scheme during for the construction and operation phases. These

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		values for intervention. This can then be measured by surveying to the foreshore levels during construction/operation of the proposal."	measures will be developed further and presented again in the ES.
Flood Risk 10.8.14 and 10.9	-	*"The Environment Agency has undertaken revised in-channel extreme water level flood modelling for the Tidal River Thames. However, we are still in the process of planning further flood modelling to update the breach modelling based on the new in channel modelling. Revising the breach modelling would therefore provide an up-to-date assessment of the residual flood risk affecting the scheme."*	The Applicant continues to engage with the Environment Agency as outlined in **Table 11-3**. The Applicant understood from the meeting between the Applicant, WSP and the Environment Agency on 20th September 2023 that the Environment Agency considers the 2018 Thames Estuary Breach Assessment to be the best available data for use within and informing the FRA and there is no requirement for site-specific breach modelling to be undertaken. The FRA will consider any new or updated information available at the time of writing.
Flood Risk	-	*"The need for flood modelling of the ditch network should be reviewed considering any changes to the network of surface water features or the floodplain."*	The ordinary watercourses (including ditches) located within the Study Area are labelled in **Figure 11-1: Surface Water Features (Volume 2)** and listed in **Table 11-9** of this technical chapter. The preliminary water environment and flood risk assessment presented within this technical chapter includes an assessment of the effects of the Proposed Scheme upon waterbodies (including ditches) and the surrounding floodplain.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			The Environment Agency has provided the outputs from the 2018 Thames Estuary Breach Assessment and confirmed that this the best information available, this will be used to provide more detailed information in relation to the local flood risk information available. This updated information will be presented in the FRA and ES.
Flood Risk	-	*"The application should consider the TE2100 Plan."*	The Applicant will consider the implications of the TE2100 Plan. Consultation and engagement is ongoing with the Environment Agency regarding the potential future raising of the River Thames flood defences.
Flood Risk	-	*"The responsibility of maintenance to the flood defence is that of the Flood Defence Owner rather than the Environment Agency as stated in section 10.3.22."*	No response required.
Flood Risk	-	*"The relevant legislation should include the Metropolitan Flood Acts."*	The Applicant notes this comment and is considering the application of those Acts to the Proposed Scheme as part of the development of the application for development consent.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
London Borough of Bexley			
Water Environment and Flood Risk	-	*"The Scoping Report states that the risk from groundwater flooding is classified as moderate, which agrees with the records the Council holds. However, impacts from groundwater have been scoped out due to the area not being at 'high risk'. Whilst the Council accept that there is only a moderate risk within the site boundaries, the marshland nature of the site can result in unexpected flooding from groundwater, and from the interaction of groundwater with other sources. For this reason, the Council believes that it should be scoped in."*	As described in **Section 11.4** an assessment of potential impacts of the Proposed Scheme on groundwater quantity and quality will be undertaken for groundwater features and other groundwater dependent receptors. The assessment will be presented in the ES.
Water Environment and Flood Risk	-	*"Table 10-1 should also reference the Bexley Local Flood Risk Management Strategy and the Bexley SuDS Design & Evaluation Guide."*	The Bexley Local Flood Risk Management Strategy 2017[32] is included in **Table11-1**. The Bexley SuDS Design & Evaluation Guide will be considered and adhered to in the development of the new drainage system for the Proposed Scheme. Further information on the drainage system is provided in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**. An Outline Drainage Strategy will be developed and included within the application for development consent.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Water Environment and Flood Risk	-	*"Section 2.1.28 incorrectly identifies the site boundary as within Flood Zone 2 whist Section 10.3.22 states that it is within Flood Zone 3. This needs to be addressed."*	**Chapter 2: Site and Proposed Scheme Description (Volume 1)** refers to the Site being within a Flood Zone 3 (as shown on **Figure 2-2: Environmental Constraints Plan –Flood Zones (Volume 2)**), and the Proposed Scheme will be assessed on that basis.
Water Environment and Flood Risk	-	*"Table 10-1 refers to Policies DP32 and DP33 of the Bexley Local Plan (2023). However, there are additional policies in the Local Plan relating to the water environment and flood risk which should also be referred to, such as DP18, DP19, DP29."*	These policies have been included in **Table11-1**.
Water Environment and Flood Risk	-	*"Design, mitigation and enhancement should address the need to raise flood defenses along the River Thames."*	The evolving design of the Proposed Scheme will take into account the requirements of the Thames Estuary 2100 Plan[33], which require raisings of the defences in the future to a specified height. Further detail will be provided in Chapter 2: Site and Proposed Scheme Description (Volume 1) of the ES. The FRA (which will be a technical appendix to the ES), will consider design, mitigation and enhancement measures specific to the Proposed Scheme.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Water Environment and Flood Risk	-	*"The Council would like to be consulted during the preparation of the Flood Risk Assessment for the application site."*	Response welcomed, the Applicant has commenced engagement with LBB and will continue to work with LBB as the DCO application and EIA progresses.
Port of London Authority			
Chapter 10: Water Environment and Flood Risk	-	*"In the operational phase of this section, it is stated that water discharges into the river. Within the ES it will be essential that further detail is provided on this including where this will be discharged, and of what velocity, volume and frequency."*	Further information on the discharge options for the Proposed Scheme, including provisional outfall locations and flow velocities is provided in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, the impacts upon the water environment will be assessed within Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES.

11.3.2. **Table 11-3** provides a summary of the consultation and engagement undertaken to inform the water environment and flood risk assessment to date.

Table 11-3: Water Environment and Flood Risk Consultation and Engagement Summary

Date and Method of Consultation	Consultee	Summary of Key Topics Discussed and Key Outcomes
15th March 2023, Meeting	Port of London Authority (PLA)	Discussion with the PLA identified a disused outfall structure located approximately 455m to the south west of the Site Boundary. The disused outfall is associated with the former Belvedere Power Station.
13th April 2023, Meeting	Environment Agency	The Environment Agency advised that it holds the Marsh Dykes Hydraulic Model, which is the best representation of flood risk in the area, and that this can be provided. The Environment Agency also advised that it has updated the TE2100 extreme water levels within the River Thames, and will update the breach modelling, although this latter aspect may not be available prior to submission of the application for development consent. The TE2100 levels can be provided for the Applicant to undertake breach modelling. Coastal modelling and sediment processes methodology was presented by WSP. It was agreed further consultation on the methodology for the FRA, the coastal modelling and sediment processes assessment would be undertaken.
Ongoing since April 2023, Emails	Environment Agency	Local flood model data requests were made via email following the meeting on the 13th April 2023 for the Marsh Dykes hydraulic model and the updated TE2100 water levels. The Environment Agency has been unable to provide the Marsh Dykes hydraulic model, due to IT issues at the time of writing. An updated coastal modelling and sediment processes assessment

Date and Method of Consultation	Consultee	Summary of Key Topics Discussed and Key Outcomes
		methodology was provided on 7th June 2023 for discussion and agreement.
Ongoing since June 2023, Emails	LBB (in their role as LLFA)	The Applicant requested data and engagement on design principles for the Outline Drainage Strategy which was agreed will be prepared as part of the DCO application.
15th September 2023, Meeting	Environment Agency	Following emails requesting the Marsh Dykes Model and TE2100 water levels, a meeting was held with the area relevant planning specialist to confirm what was outstanding and to whom the requests for data had been sent. Follow up actions were assigned to both parties.
20th September 2023, Meeting	Environment Agency	Meeting to discuss the data available and the methodology for the FRA and the methodology for the coastal modelling and sediment processes assessment. The Environment Agency confirmed that they have no concerns regarding sedimentation of the Great Breach Outfall, vessel wash, intertidal habitats, and impacts on the River Thames flood defences. The Environment Agency also confirmed that sediment modelling would be required. It was confirmed that the existing 2018 Thames Estuary Breach Assessment is the best available data for use within and informing the FRA and there is no requirement for site-specific breach modelling to be undertaken. The Environment Agency's key concern in relation to flood risk is regarding people and keeping people safe. This will be considered and taken into account during ongoing consultation and design evolution.

11.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

11.4.1. The water environment and flood risk assessment of the Proposed Scheme has been undertaken in line with the legislation, policy and guidance described in **Section 11.2**.

POTENTIAL SIGNIFICANT EFFECTS

11.4.2. As set out in the EIA Scoping Report[27], and in light of the assessments undertaken since then, the following effects are considered to be significant and have been considered further in this assessment:

- Construction Phase:
  - Surface Water Features:
    - Quality of surface water features (including the biological, physico-chemical and hydromorphological quality aspects); and
    - Quantity of surface water features / flows.
  - Groundwater Features: Groundwater quality and quantity (level and flow) of the Secondary A bedrock aquifers (Lambeth Group including Thanet Sand Formation) and superficial deposit aquifers designated Secondary (undifferentiated and Secondary A aquifers (Alluvium, Head Deposits and Taplow Gravel Member)).
  - WFD Designated Water Bodies: Biological, physico-chemical and hydromorphological quality elements of the WFD designated water bodies (Thames Middle Water Body and Greenwich Tertiaries and Chalk Groundwater Body).
  - Coastal Processes: Sediment Transport Regime.
  - Flood Risk:
    - Breach of the River Thames flood defences;
    - Flooding from Marsh Dykes;
    - Loss of watercourse channel;
    - Flood risk associated with the Proposed Jetty;
    - Surface water flooding;
    - Groundwater;
    - Artificial sources; and
    - Flood risk to people.
- Operation Phase:
  - Surface Water Features: Quality of surface water features (including the biological, physico-chemical and hydromorphological quality aspects); and
    - Quantity of surface water features / flows.
  - Groundwater Features:
    - Impacts to groundwater flows and levels on the Thanet Sand and Lambeth Group (bedrock) Secondary A aquifers and superficial deposit aquifers designated Secondary Undifferentiated and Secondary A aquifers (Alluvium, Head Deposits and Taplow Gravel Member, respectively); and

  - Groundwater quality of the superficial and bedrock aquifers.
- WFD Designated Water Bodies: Biological, physico-chemical and hydromorphological quality elements of the WFD designated water body (Thames Middle Water Body and Greenwich Tertiaries and Chalk Groundwater Body).
- Coastal Processes: Sediment Transport Regime.
- Flood Risk:
  - Breach of the River Thames flood defences;
  - Flooding from Marsh Dykes;
  - Loss of watercourse channel;
  - Flood risk associated with the Proposed Jetty;
  - Surface water flooding;
  - Groundwater flooding;
  - Artificial sources; and
  - Flood risk to people.

11.4.3. This technical chapter will assess the effects to the quality and quantity of groundwater resources associated with surface borne pollutants (such as surface water runoff and spillages). The risks to the quality, quantity and flow of groundwater resources (controlled waters) associated with other aspects such as contaminated land are discussed and assessed in **Chapter 17: Ground Conditions and Soils (Volume 1)**.

MATTERS SCOPED OUT

11.4.4. The following effects are considered to be unlikely to be significant and therefore have not been considered further in this assessment:

- impacts to groundwater associated users (including licensed, private and unlicenced groundwater abstractions);
- impacts to potable water demand;*
- impacts on groundwater or surface water quality and quantity resulting from the water supply options;*
- impacts to Groundwater Dependent Terrestrial Ecosystems (GWDTEs) including springs; and
- impacts on water quality resulting from the proposed dredging works (construction and operation phases), including the disposal of material. The impacts on marine biodiversity are covered in **Chapter 8: Marine Biodiversity (Volume 1)** and waste disposal is covered in **Chapter: 16 Materials and Waste (Volume 1)**. This chapter will address the geomorphology impacts.*

11.4.5. Note the points marked with a * have been modified from the Scoping Report[28] based upon design iterations or additional assessment.

SENSITIVE RECEPTORS

11.4.6. **Table 11-4** and **Figure 11-1: Surface Water Features (Volume 2)** shows the sensitive receptors identified:

Table 11-4: Water Environment and Flood Risk Sensitive Receptors

Receptor	
River Thames (including Thames Middle WFD Water Body)	
Marsh Dykes	
Ponds	Pond 1
	Pond 2
	Pond 3
	Pond 4
	Pond 5
	Pond 6
	Pond 7
	Great Breach Pond
	Crossness Pond 1
	Crossness Pond 2
	Crossness Pond 3
	Crossness Pond 4
	Education Pond
	Wader Scrape
Floodplain (associated with a breach of the River Thames flood defences)	
Floodplain (associated with Marsh Dykes)	
Crossness LNR (partially located within the Site)	
People (e.g., site visitors and staff and users of adjacent third party land)	
Thanet Sand and Lambeth Group (bedrock) Secondary A aquifer	
Superficial deposit aquifers designated Secondary Undifferentiated aquifers (Alluvium and Head Deposits) and Secondary A aquifer (Taplow Gravel Member)	

11.4.7. All of the ponds within the Study Area are currently included as sensitive receptors. This list will be reviewed and refined following further hydrological and ecological surveys and any additional information that becomes available for inclusion within the ES. Ponds will be scoped out of further assessment if they have no habitat suitable for Great Crested Newts and/or it is considered that they have no hydraulic connectivity (via surface water pathways) to the Proposed Scheme.

BASELINE DATA COLLECTION

11.4.8. A desk-based data collection exercise has been undertaken, including a review of available information to determine the baseline conditions in the relevant geographical areas of effect.

11.4.9. The key sources of information used to determine the baseline water environment and flood risk conditions are:

- Environment Agency online Flood Map for Planning[34];
- Environment Agency online Long-Term Risk of Flooding[30];
- Environment Agency online Flood Risk from Reservoirs Map[35];
- Environment Agency Recorded Flood Outlines Map[36];
- Environment Agency online Catchment Data Explorer[37];
- Environment Agency Thames River Basin District River Basin Management Plan[38];
- Ordnance Survey Mapping[39];
- Environment Agency LiDAR Digital Terrain Model[40];
- Department for Environment, Food and Rural Affairs (DEFRA) MAGIC online Mapping[41];
- British Geological Survey (BGS) Geology of Britain Viewer[42];
- BGS Geological Map Sheet 257 and Map Sheet 271[43];
- Riverside Data Centre Ground Investigation Report[44];
- Groundsure Report[45];
- London Borough of Bexley Level 1 SFRA[7];
- National Library of Scotland, Historical Mapping[46];
- Flood Estimation Handbook Web Service[47];
- Cory Riverside Energy Park Environmental Statement Chapter 12: Hydrology, Flood Risk and Water Resources and associated Technical Appendices[48];
- Riverside Resource Recovery Facility Tidal Flood Risk Assessment[49];
- Thames Estuary 2100 (TE2100) In-channel Extreme Water Levels[50]; and
- Thames Estuary Breach Assessment[51].

ASSESSMENT METHODOLOGY

11.4.10. The text in this chapter presents the information gathered and the assessment approach used to date.

11.4.11. The approach to assessment, for both the construction and operation phases of the Proposed Scheme, will continue to be discussed, with a view to reaching agreement with the LLFA, PLA, Environment Agency and the MMO, as appropriate.

11.4.12. Consequently, further, detailed assessments will be provided within the ES for surface water features, groundwater, WFD designated water bodies, coastal processes and flood risk.

Surface Water Features

11.4.13. The assessment of potential effects on surface water features will be informed using publicly available information. The water quantity and quality effects will be assessed qualitatively associated with pollutants typically experienced during construction and operation of the Proposed Scheme.

Groundwater Features

11.4.14. An assessment of potential impacts of the Proposed Scheme on groundwater quantity and quality will be undertaken with respect to groundwater features and other groundwater dependent receptors.

11.4.15. An assessment of the potential impacts from localised excavations for the Proposed Scheme (i.e., intrusive earthworks such as sheet piling) on groundwater resources and aquifers has not been assessed in this PEIR and will be addressed accordingly at ES stage. Reference will be made in the ES to the risks associated with such activities (including impacts to groundwater quality, quantity and groundwater flooding) and measures that will be adopted to avoid or reduce/minimise the risk of likely significant effects occurring.

WFD Designated Water Bodies

11.4.16. Further to the WFD Screening Report included as Appendix A to the EIA Scoping Report[2828], a WFD Assessment for the Thames Middle Water Body and Greenwich Tertiaries and Chalk Groundwater Body will be prepared as a technical appendix to the ES. The Thames Middle Water Body and Greenwich Tertiaries and Chalk Groundwater Body are vast in comparison to the Site. Consequently, any potential effects are expected to be minimal compared to the surface area of the water bodies. This also applies to any impacts from the Proposed Scheme upon any undesignated water bodies and the resultant effects.

Coastal Processes

11.4.17. A detailed hydrodynamic site-specific modelling study will be undertaken in the “MIKE by DHI” software package to establish the sensitivity and magnitude of any changes to the hydrodynamics of the River Thames during the construction and operation phases of the Proposed Scheme. Agreement on the modelling approach is currently being sought with the Environment Agency and the PLA as described in **Section 11.3**.

11.4.18. It is envisaged that the coastal model extents will cover the entire inner Thames reach with the upstream tidal boundary located at Richmond extending downstream to Coryton. The model extents have been selected to ensure that the boundary locations are sufficiently far away to avoid impacting the outcomes from the modelling investigation.

11.4.19. Sediment plume modelling will be undertaken using the calibrated Thames Estuary hydrodynamic model to consider the dispersion (extent and likely concentration) of any mobilised sediments caused by the proposed dredging activities. Furthermore, bed shear stresses extracted from the calibrated hydrodynamic model will be reviewed to confirm any potential changes to the sediment regime adjacent to the Site Boundary. Using the outcomes from the modelling studies alongside expert judgement and local analogies (Middleton Wharf), likely maintenance dredging requirements will be assessed within the main dredging area. The coastal processes assessment will build upon the findings of the Environment Agency's TE2100 Study[31] and expert opinion to provide a qualitative assessment of the potential effects on the inner Thames reach from the Proposed Scheme, including frequency and extents of dredging that may be required.

11.4.20. The coastal processes (sediment transport regime) assessment will be presented within the ES.

Flood Risk

11.4.21. The assessment will consider the potential likely significant effects of the Proposed Scheme on flood risk from all sources to people and property elsewhere, as well as the risk of flooding to the Proposed Scheme. A FRA will be prepared as a technical appendix to the ES.

11.4.22. The FRA will be informed by the outputs from the Environment Agency's 2018 River Thames Estuary Breach Assessment. Consultation and engagement is ongoing with the Environment Agency to agree the methodology for the FRA.

SIGNIFICANCE CRITERIA

11.4.23. The assessment of the effects during both the construction and operation phases will be undertaken following the principles set out within the Design Manual for Roads and Bridges (DMRB) LA 113 – Road Drainage and the Water Environment[52]. Although not directly applicable to the nature of the Proposed Scheme, the DMRB guidance provides a good basis for assessing effects of developments on the water environment and flood risk.

11.4.24. The DMRB LA 113[52] promotes the following approach:

- Estimation of the sensitivity of the receptor. The sensitivity of the feature or resource is based on the value and sensitivity of the feature or resource as shown in **Table 11-5** below.
- Estimation of the magnitude of the impact. The magnitude of an impact is estimated based on the potential size or scale of change compared to the baseline and is independent to the sensitivity of the receptor as shown in **Table 11-6** below.
- Assessment of the significance of the effect. The overall significance of the effect is determined by combining the sensitivity of the receptor and the magnitude of the impact.

Table 11-5: Water Environment and Flood Risk Sensitivity Criteria

Receptor Sensitivity	Criteria	Examples
Very High	Nationally significant receptor of high sensitivity	• WFD classification shown in a River Basin Management Plan (RBMP) and Q95 ≥ 1. 0 m^3/s. • Site protected/designated under EC or UK legislation (SAC, SPA, SSSI, Ramsar site, salmonid water)/Species protected by EC legislation.
		• Principal aquifer providing a regionally important resource and/or supporting a site protected under EC and UK Legislation. • Groundwater locally supports GWDTE. • SPZ 1.
		• Essential infrastructure or highly vulnerable development.
High	Locally significant receptor of high sensitivity	• Watercourse having a WFD classification shown in a RBMP and Q95. • Species protected under EC or UK legislation.
		• Principal aquifer providing locally important resource or supporting a river ecosystem. • Groundwater supports GWDTE. • SPZ 2.
		• More vulnerable development.
Medium	Of moderate quality and rarity	• Watercourses not having a WFD classification shown in a RBMP and Q95 >0.001 m3 /s.
		• Aquifer providing water for agricultural or industrial use with limited connection to surface water. • SPZ 3.
		• Less vulnerable development.
Low	Lower Quality	• Watercourses not having a WFD classification shown in a RBMP and Q95 ≤0.001 m3 /s.
		• Unproductive strata.
		• Water compatible development.
Negligible	Attribute of very low quality	• Water features within the Proposed Scheme which form part of the drainage system with no other allocation.

Table 11-6: Water Environmental and Flood Risk Magnitude Criteria

Magnitude	Criteria	Example
Major Adverse	Results in loss of attribute and / or quality and integrity of the attribute	Change to the environmental status / classification of a water feature, including water quality classification. Loss or extensive change to a fishery / designated nature conservation site. Loss of regionally important public water supply. Reduction in surface water body or groundwater WFD classification. Loss of, or extensive change to, an aquifer. Loss of regionally important groundwater supply. Loss of, or extensive change to GWDTE or baseflow contribution to protected surface water bodies. Loss or significant damage to major structures through subsidence or similar effects. Increase in peak flood level (1 in 100 year event) > 100 mm)*. Loss of flood storage areas. Changes to site resulting in an increase in surface / foul water discharge / runoff of > 75% with insufficient capacity in the flood / sewerage network.
Moderate Adverse	Results in effect on integrity of attribute, or loss of part of attribute	Partial loss in productivity of a fishery. Degradation of regionally important public water supply or loss of major commercial / industrial / agricultural supplies. Contribution to reduction in water body WFD classification. Partial loss or change to an aquifer. Pollution of a receiving water body, but insufficient to change the environmental status / classification, including water quality classification. Changes to site resulting in an increase in surface / foul water discharge / runoff of > 50% with insufficient capacity in the flood / sewerage network. Increase in peak flood level (1 in 100 year event) > 50 mm*.
Minor Adverse	Results in some measurable change in	Potential low risk of some pollution to a surface water or groundwater body, but insufficient to cause loss in quality, fishery productivity or biodiversity.

Magnitude	Criteria	Example
	attributes, quality or vulnerability	Changes to site resulting in an increase in surface or foul water discharge / runoff of > 25% with insufficient capacity in the flood / sewerage network. Increase in peak flood level (1 in 100-year event) > 10 mm*.
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity	The Proposed Scheme is unlikely to affect the integrity of the water environment. No measurable impact upon an aquifer. Negligible change in peak flood level (1 in 100-year event) < + / -10 mm*.
No Change	Results in no change to the receptor	No predicted positive or negative impact to the receptor.
Minor Beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring	Potential for slight reduction in pollution to a surface water or groundwater body, but insufficient to cause noticeable benefit in quality, fishery productivity or biodiversity. Reduction of groundwater hazard to existing structures. Reductions in waterlogging and groundwater flooding. Changes to site resulting in a decrease in surface / foul water discharge / runoff > 25%. Creation of flood storage and decrease in peak flood level (1 in 100-year event) > 10 mm*.
Moderate Beneficial	Results in moderate improvement of attribute quality	Moderate improvement to a fishery / designated nature conservation site. Potential increase in the productivity of a fishery. Reduced pollution of a receiving water body, but insufficient to change the environmental status / classification, including water quality classification. Improvement in groundwater Catchment Abstraction Management Strategy (CAMS) (or equivalent) classification. Support to significant improvements in damaged GWDTE. Changes to site resulting in a decrease in surface / foul water discharge / runoff > 50%.

Magnitude	Criteria	Example
		Creation of flood storage and decrease in peak flood level (1 in 100-year event) > 50 mm*.
Major Beneficial	Results in major improvement of attribute quality	Significant improvement to a fishery / designated nature conservation site. Removal of existing polluting discharge or removing the likelihood of polluting discharges occurring. Change to the environmental status / classification of a water feature, including water quality classification. Changes to site resulting in a surface / foul water decrease in discharge / runoff of > 75%. Creation of flood storage and decrease in peak flood level (1 in 100-year event) > 100 mm*.

*beyond model tolerance.

11.4.25. The significance of potential impacts is classified by considering both the importance of the receptor (**Table 11-5**) and the magnitude of the impact (**Table 11-6**), using the matrix shown in **Table 11-7** below, adapted from Table 3.8.1 of DMRB LA 104[53]. Noting that, where the significance of the effect is described as between two levels, professional judgement is used to identify the level of significance.

11.4.26. Only Moderate and Major effects are considered to be significant in EIA terms.

Table 11-7: Water Environment and Flood Risk – Significance Criteria

		Magnitude of Impact				
		No Change	**Negligible**	**Minor**	**Moderate**	**Major**
Receptor Sensitivity	**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

11.5. STUDY AREA

11.5.1. Study Areas have been identified for surface water features, groundwater, WFD designated water bodies, coastal processes and flood risk. A description of each of the Study Areas is provided in the following sections and shown in **Figure 11-2: Water Environment Study Area (Volume 2)**.

Surface Water Features

11.5.2. The Site is located within a discrete surface water catchment, which is understood to be controlled by two Environment Agency Pumping Stations (Great Breach and Green Level) that outfall to the River Thames **(Figure 11-1: Surface Water Features (Volume 2))**. It is considered that reversal of flows could occur within the connected surface water features, depending on the tidal flow and pumping regime. As such, the surface water features Study Area (for the construction and operation phases) includes extents of the River Thames 500m upstream and downstream of the two Environment Agency Pumping Stations and the network of surface watercourses/drains between the two Environment Agency Pumping Stations.

Groundwater

11.5.3. The groundwater Study Area is generally 2km from the Site Boundary; but not beyond the north bank of the River Thames as it would act as a barrier to groundwater impacts being conveyed upgradient on the north bank.

WFD Designated Water Bodies

11.5.4. The Study Area for the WFD assessment consists of the Thames Middle Water Body (GB530603911402) and the Greenwich Tertiaries and Chalk Water Body WFD Groundwater Body (GB40602G602500).

Coastal Processes

11.5.5. The coastal processes model covers the reach of the Thames between Richmond (approximately 32km west of the Site Boundary) and Coryton (approximately 27km east of the Site Boundary). A higher level of model resolution (approximately 1km) has been defined over the immediate project frontage to capture the Proposed Scheme design changes. This 1km will be the Study Area, any significant changes beyond this distance will be included if deemed appropriate based on professional judgement.

Flood Risk

11.5.6. The flood risk Study Area is identical to the surface water features Study Area described above. It is expected that any flood risk impacts associated with the Proposed Scheme would be localised due to scale of the River Thames and the defences in situ.

11.5.7. At this stage the impacts of piling on groundwater levels and the flood risk to third parties are expected to be localised and contained within the surface water features Study Area, this will be reviewed and assessed as necessary in the ES.

11.5.8. An Outline Drainage Strategy will be prepared as part of the application for development consent, which will be limited to the Site.

11.6. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

Surface Water Features

11.6.1. There are main rivers, ordinary watercourses and ponds located within the Site and Study Area, as summarised below. The Study Area is described in **Section 11.5**.

11.6.2. The main rivers located within the Study Area are labelled in **Figure 11-1: Surface Water Features (Volume 2)** and listed in **Table 11-8** below.

Table 11-8: Main rivers Located within the Study Area

Main River	Distance from Site Boundary
River Thames	Located within the Site.
Mulberry Way River and Tributaries	Located within the Site.
Belvedere Stream	Located within the Site.
Great Breach Lagoon	Located approximately 15m west from the Site Boundary.
Great Breach Dyke North Culvert	Located approximately 20m west from the Site Boundary, in culvert.
Great Breach Dyke West	Located approximately 160m west from the Site Boundary.

11.6.3. The ordinary watercourses located within the Study Area are labelled in **Figure 11-1: Surface Water Features (Volume 2)** and listed in **Table 11-9** below:

Table 11-9: Ordinary Watercourses Located within the Study Area

Ordinary Watercourse	Distance from Site Boundary
North Dyke	Located within the Site.
Stable Paddock Ditch	Located within the Site.
West Paddock Ditch	Located within the Site.
Cory Field South Ditch	Located within the Site.
Iron Mountain Ditch	Located within the Site.
Norman Road Stream	Located within the Site.
Horse Head Ditch	Located approximately 55m west from the Site Boundary.
Great Breach Ditch	Located approximately 60m west from the Site Boundary.
Reedbed Dyke	Located approximately 260m west from the Site Boundary.
Reedbed Ditch 1	Located approximately 260m west from the Site Boundary.
Reedbed Ditch 2	Located approximately 260m west from the Site Boundary.

11.6.4. The ponds located within the Study Area are labelled in **Figure 11-1: Surface Water Features (Volume 2)** and are listed in **Table 11-10** below:

Table 11-10: Ponds Located within the Study Area

Ponds	Distance from Site Boundary
Pond 1	Located within the Site.
Pond 2	Located within the Site.
Pond 3	Located within the Site.
Pond 4	Located within the Site.
Pond 5	Located within the Site.
Pond 6	Located within the Site.
Pond 7	Located within the Site.
Great Breach Pond	Located approximately 140m from the Site Boundary.
Crossness Pond 1	Located approximately 140m from the Site Boundary.
Crossness Pond 2	Located approximately 100m from the Site Boundary.
Crossness Pond 3	Located approximately 100m from the Site Boundary.
Crossness Pond 4	Located approximately 100m from the Site Boundary.
Education Pond	Located approximately 190m from the Site Boundary.
Wader Scrape	Located approximately 200m from the Site Boundary.

11.6.5. The surface water connectivity of the Study Area is complex and will be detailed in the ES. It is expected that the main rivers (excluding the River Thames) outfall into the River Thames, via two Environment Agency Pumping Stations located approximately 10m to the northwest (Great Breach Pumping Station) and 1km to the southeast from the Site Boundary (Green Level Pumping Station), with the ordinary watercourses and ponds ultimately discharging to the main rivers. Each Environment Agency Pumping Station has an accompanying outfall located approximately 80m to the west of the Site Boundary (Great Breach Outfall) and approximately 1.2km to the southeast of the Site Boundary (Green Level Outfall). The location of the Environment Agency Pumping Stations and outfalls are shown on **Figure 11-1: Surface Water Features (Volume 2)**.

11.6.6. Two active licenced surface water abstraction points are located approximately 15m and 30m to the west of the Site Boundary. The surface water abstractions are from the Great Breach Dyke North, for use by Thames Water as make up/top up water[45]. No other licenced abstractions are located within 500m of the Site Boundary.

11.6.7. There is one active licenced surface water discharge located within the Site that flows into the River Thames; this is associated with site drainage at the Lidl warehouse. Outside of the Site, there are two additional discharges on the southern bank of the River Thames, the first is approximately 300m to the west for the final/ treated effluent from the Crossness Sewage Treatment Works, owned and managed by Thames Water[45] and the second is approximately 460m east for a water company (assumed to be Thames Water) to pump sewage discharges from a pumping station located on Crabtree Manorway. On the northern bank of the River Thames there are additional discharges for treated/final sewage effluent from a transfer facility on Frog Island which discharges to the ground/groundwater approximately 465m north of the Site Boundary. Historically there have been additional discharges, the licences for which are now revoked or surrendered.

11.6.8. Engagement with the PLA identified a disused outfall structure located approximately 455m to the southwest of the Site Boundary, associated with the former Belvedere Power Station. The PLA has confirmed this outfall is not currently in use and is not expected to be used in the future.

Groundwater

11.6.9. The main characteristics of the geology (superficial and bedrock) that underlies the Proposed Scheme are described in **Section 17.6** of **Chapter 17: Ground Conditions and Soils (Volume 1)**.

11.6.10. A review of BGS mapping[42] shows that the Site is underlain by Alluvium, Head Deposits and Taplow Gravel Member. These superficial deposits are underlain by the London Clay Formation and Lambeth Group (bedrock geology) in the northern and southern parts of the Proposed Scheme Site respectively. The Chalk underlies the site at depth.

11.6.11. Alluvium and Head Deposits are designed Secondary (undifferentiated) and Taplow Gravel Member designated Secondary A aquifer. The London Clay Formation is designated an Unproductive aquifer and the Lambeth Group designated a Secondary A aquifer. The Chalk is designated a Principal aquifer and not considered to be directly impacted by the Proposed Scheme based on the preliminary design.

Groundwater Levels and Flow

11.6.12. Previous and historical ground investigation (GI) data, including data on groundwater level and flow, is available for the northern part of the Site Boundary from the 2017 WSP Ground Investigation Report[44]. This data is considered appropriate to inform the baseline and is complemented by freely available online data sources[41] [42] [43] where gaps in site specific baseline data exist.

11.6.13. Groundwater level monitoring was undertaken on four occasions between 2nd March 2017 and 22nd March 2017[44]. The average depth to groundwater level is recorded at 0.89mbgl for the northern part of the site (**Table 11-11**). **Figure 17-2: Previous Ground Investigations (Volume 2)** shows the location of previous ground investigations undertaken.

11.6.14. Variable groundwater levels were recorded across the Site during the 2017 GI[44]. This variation is indicative of hydraulic continuity within the shallow strata (Made Ground, Alluvium and Taplow Gravels Member). Local groundwater flow direction and groundwater level vary due to the presence of drains and watercourses surrounding the site and tidal influence from the River Thames to the north.

Table 11-11: Summary of Historical Groundwater Level Records

Exploratory Hole/Elevation (mAOD)*	Response Zone	Groundwater Elevation (mAOD)**			Groundwater Level (mbgl)**		
		Min	Mean	Max	Min	Mean	Max
BH101S (1.344)	Made Ground	-0.09	0.02	0.10	1.25	1.60	1.43
BH101D	Taplow Gravels	-0.86	-0.47	0.00	1.34	1.80	2.21
BH102S (1.338)	Alluvium	-0.59	-0.16	0.64	0.7	1.50	1.93
BH102D	Taplow Gravels	-0.63	-0.28	0.39	0.95	1.60	2.08
BH103S (1.309)	Alluvium	-1.32	-1.06	-0.61	1.92	2.40	2.63
BH103D	Taplow Gravels	-0.77	-0.38	-0.04	1.35	1.70	2.08
WS201 (1.524)	Made Ground	0.49	0.69	0.82	0.7	0.80	1.03
WS202 (0.783)	Made Ground	-1.28	-0.64	0.06	0.72	1.40	2.06
WS203 (1.002)	Alluvium	0.52	0.67	0.76	0.24	0.30	0.49
WS204 (0.587)	Alluvium	0.06	0.15	0.30	0.29	0.40	0.53
WS205 (1.26)	Alluvium	-0.06	0.38	0.57	0.70	0.90	1.33
WS206 (0.98)	Alluvium	0.51	0.72	0.85	0.14	0.30	0.47
WS207 (1.739)	Made Ground	0.47	0.52	0.55	1.185	1.20	1.265
WS208 (1.164)	Made Ground	0.08	0.16	0.21	0.95	1.00	1.08

Table notes:

*shallow and deep monitoring installations denoted by (S) and (D) respectively.

**mAOD denotes meters above ordnance datum; mbgl denotes metres below ground level.

Groundwater Abstractions

11.6.15. No data/information is available on small private (non-licenced) water supplies. These relate to abstractions with quantities <20 m^3/d that do not require a licence or groundwater investigation consent from the Environment Agency. LBB confirmed that it does not hold data/information on small private (non-licenced) water supplies, and on this basis, it is assumed that none exist within 1km of the Proposed Scheme. Consequently, groundwater abstractions will not be assessed further.

Groundwater Quality

11.6.16. Under the WFD the Environment Agency has determined the Proposed Scheme lies within the Greenwich Tertiaries and Chalk Water Body (GB40602G602500) which is classified as having Poor Overall Status (2019 Cycle 3). The groundwater water body is linked to protected areas under the Drinking Water Directive.

11.6.17. The Environment Agency's groundwater vulnerability map shows the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a single square kilometre. The groundwater vulnerability map indicates that the Proposed Scheme has a Medium – High groundwater vulnerability. Considering the current land use, there is potential for contaminated soil to be present within the Site.

11.6.18. No groundwater quality data has been provided through consultation and engagement on the Proposed Scheme to date. The data that is obtained will inform the EIA with the outcomes, as appropriate to construction and operation phase risks to groundwater receptors and will be reported in the ES.

Groundwater Dependent Terrestrial Ecosystem (GWDTE)

11.6.19. Based on the GWDTE Map of England, no GWDTE's have been identified within 1km of the Proposed Scheme. The closest GWDTE (Abbey Wood SSSI), approximately 2km south, has been scoped out. The Inner Thames Marshes SSSI is approximately 2km north east and is unlikely to be affected by the Proposed Scheme and is separated by the River Thames. On this basis, the Groundwater Dependent Terrestrial Ecosystems (GWDTE) are not considered further in the preliminary assessment.

Groundwater Flooding

11.6.20. Groundwater flooding usually occurs in low lying areas underlain by permeable rock and aquifers that allow groundwater to rise to the surface through the permeable subsoil following long periods of wet weather. Low lying areas may be more susceptible to groundwater flooding because the water table is usually at much shallower depth and often intersects the surface in valley bottoms providing baseflow for rivers and streams.

11.6.21. The Proposed Scheme is susceptible to a moderate groundwater flooding risk[45] and likely related to the permeable superficial deposits Alluvium and Taplow Gravel Member. The superficial deposits are in hydraulic continuity with the underlying Lambeth Group and groundwater levels responsive to tidal influences of the River Thames.

11.6.22. The LBB Level 1 SFRA[7] indicates that elevated groundwater from permeable superficial soils are located in the lower Thamesmead area of the LBB and shows elevated groundwater from consolidated aquifers along the eastern edge of the LBB boundary. The Level 1 SFRA identifies other potential source of groundwater related flooding where superficial sand and/or gravel deposits are perched on the clay strata (i.e., London Clay Formation). In these instances, the local sand/gravel aquifer (Alluvium and/or Taplow Gravel Member) can become saturated during prolonged intense rainfall and result in flooding at the surface.

11.6.23. The LBB Level 1 SFRA[7] identifies a record of historic groundwater flooding (between 1960 and 2019) where issues with standing water are thought to be caused by the interaction of high groundwater levels and limited capacity sewers.

11.6.24. Groundwater flooding risks are often highly localised and dependent upon geological interfaces between permeable and impermeable subsoils. It is important to understand site specific ground conditions. Considering the above information, there is a potential risk of flooding from groundwater, and this will be assessed in the ES as more data becomes available.

WFD Designated Water Bodies

11.6.25. There is one WFD designated surface water body located within the Study Area, the Thames Middle Water Body (GB530603911402); a transitional water body that is heavily modified. The Thames Middle Water Body is designated for its biological, physicochemical and hydromorphological quality elements. The area of the Site within the River Thames is located within the London Management Catchment but outside of any designated Operational WFD Catchment. However, the network of ordinary watercourses and main rivers within, and adjacent to, the Site flow into the Thames Middle Water Body, and thus any impacts to these could potentially impact upon some of the WFD indicators.

11.6.26. Information regarding Greenwich Tertiaries and Chalk Water Body (GB40602G602500) is detailed in the groundwater baseline conditions section above (**Paragraph 11.6.16** to **Paragraph 11.6.18**).

Coastal Processes

11.6.27. The tidally influenced section of the River Thames, the Thames Estuary, is included within the Site. Here, water levels range from approximately +3.6m AoD (Mean High Water Spring) to –2.4m AoD (Mean Low Water Spring) with a total mean spring tidal range of around approximately 6m. Tide levels can be higher during more extreme tidal events such as storm surges.

11.6.28. Current speeds are typically up to around 1.7m/s over mean spring tides with these peaks in currents occurring on the flood tide. Over neap tides, typical current speeds are around 1.2m/s again typically occurring on the flood tide.

11.6.29. The Thames Estuary seabed is highly mobile with sediment transport occurring both on the ebb and flood tides. Typically, the dominant sediment type in this section of the Thames is soft alluvium muds.

Existing Drainage

11.6.30. An Outline Drainage Strategy is in place for Riverside 1 and a Surface and Foul Water Drainage Strategy[54] is under construction for Riverside 2.

11.6.31. There are surface water features (see **Section 11.6.1** to **11.6.8** for details) and ditches adjacent to Norman Road, which receive surface water runoff from the surrounding area.

11.6.32. An Outline Drainage Strategy will be submitted as part of the DCO application.

11.6.33. There are no springs known to be situated in proximity to the Site and therefore the impact to springs has not been assessed.

Flood Risk

11.6.34. The Environment Agency Flood Map for Planning[34] shows the flood risk associated with the Site. The map indicates that the Site is located within Flood Zone 3, within the undefended tidal flood extent of the 1 in 200-year event (0.5% Annual Probability of Exceedance event – APE), excluding the presence of flood defences. The Flood Zones are shown in **Figure 2-2: Environment Constraints Plan – Flood Zones (Volume 2)**. However, there are Flood Defence Owner maintained flood defences located along the River Thames, parts of which are within the Site. These currently provide the Site with a reduction in local flood risk.

The Environment Agency's Long Term Flood Risk of Flooding map[30] shows the flood risk from surface water sources; it is likely based upon 2010 LiDAR data of the Site. Consultation and engagement relating to flood risk mapping and how this will be used to prepare the FRA is ongoing with the Environment Agency.

11.6.35. It is considered that the predicted flood risk from surface water sources as shown on the Environment Agency online mapping is not representative of the current flood risk. The flood risk information, including that adopted for the assessment, will be presented in the FRA prepared for the Proposed Scheme, which will also detail the mitigation measures (including floodplain compensation).

FUTURE BASELINE

11.6.36. The future baseline for the Proposed Scheme will include the operation of Riverside 2. The future baseline is unlikely to change from that of the baseline in relation to the WFD and coastal processes. However, it is considered that Riverside 2 is likely to change the baseline in relation to:

- surface water features;
- groundwater; and
- flood risk.

11.6.37. A summary of each of the likely changes is provided below.

Surface Water Features

11.6.38. Riverside 2 incorporates mitigation measures (as detailed within the Chapter 12: Hydrology Flood Risk and Water Resources of the Riverside 2 ES[55] and the associated Surface and Foul Water Drainage Strategy[54]) to ensure that there are no significant effects on surface water features within or adjacent to Riverside 2, once it is operational.

Groundwater

11.6.39. The effects of climate change may impact on groundwater levels (locally) within the Study Area including impacts from Riverside 2, due to hydraulic connectivity to surface water, changes to precipitation patterns and groundwater recharge. The combined climate change effects may lead to greater interaction between surface waters and groundwater in the future. Therefore, allowances will be included in the design to account for these future changes to the water environment to improve the sustainability and future-proof the Proposed Scheme.

11.6.40. The overall effect on the natural groundwater regime (quantity and quality) from climate change is unpredictable due to various climate change factors directly influencing associated resources in opposing ways; high temperatures reducing groundwater recharge, changes to rainfall patterns altering the seasonality and long term groundwater recharge and enhanced extremes increasing regime variability. The groundwater regime may be further impacted indirectly by climate change due to associated changes in anthropogenic behaviour affecting land use and water resource development / management.

11.6.41. Climate change impacts on groundwater receptors will be considered further in the ES as further information becomes available.

Flood Risk

11.6.42. Riverside 2 incorporates mitigation measures (as detailed within the Chapter 12: Hydrology Flood Risk and Water Resources of the Riverside 2 ES[55], Flood Risk Assessment[56] and Surface and Foul Water Drainage Design Strategy[55]) to ensure that there are no significant effects on flood risk.

11.6.43. As a result of climate change the future baseline is anticipated to deteriorate from its current baseline, with there being an increasing frequency and increasing depths of fluvial, surface water and tidal flooding.

11.6.44. Fluvial, surface water and tidal flood risk is expected to increase as a consequence of climate change which is predicted to result in increased sea levels, greater tide locking, higher peak fluvial flows, and more intense rainfall events. Pertinent information from the Environment Agency's Flood Risk Assessments Climate Change Allowances[57] is presented in **Table 11-12** to **Table 11-14** and will be appropriately accounted for in the ES following engagement with the Environment Agency and LBB.

Table 11-12: London Management Catchment Peak River Flow Allowances

Epoch	Central (%)	Higher (%)	Upper (%)
2020s	10	14	26
2050s	7	14	30
2080s	17	27	54

Table 11-13: London Management Catchment Peak Rainfall Allowances

Period	Central	Upper end
2080s	25%	40%

Table 11-14: Sea Level Allowances for the Southeast and River Thames for Each Epoch in mm for Each Year (based on a 1981 to 2000 baseline) (the Total Sea Level Rise for Each Epoch is shown in Brackets)

Allowance (Increase per Annum)	Epoch 2000 to 2035 (mm)	Epoch 2036 to 2065 (mm)	Epoch 2066 to 2095 (mm)	Epoch 2096 to 2125 (mm)
Higher Central	5.7 (200)	8.7 (261)	11.6 (348)	13.1 (393)
Upper End	6.9 (242)	11.3 (339)	15.8 (474)	18.2 (546)

11.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

11.7.1. This section sets out the embedded design, mitigation and enhancement measures relevant to the water environment and flood risk assessment Construction Phase.

11.7.2. Mitigation required during construction will be recorded in an OCoCP to be submitted as part of the DCO application. The DCO will include a requirement that will ensure the measures identified in the OCoCP to mitigate the effects of the construction phase are included in a full CoCP, which will be prepared for the Proposed Scheme by the Contractor prior to the construction phase commencing.

11.7.3. The OCoCP will include method statements for the proposed works, details of materials to be used, and an emergency response plan. The OCoCP will set out how construction activities will be undertaken in accordance with appropriate good practice guidance including (but not limited to) the following:

- CIRIA (C532) Control of Water Pollution from Construction Sites[58]; and
- CIRIA (C741) Environmental Good Practice Onsite Guide[59].

11.7.4. Guidance for Pollution Prevention (GPP)[60] is currently being developed and published to provide environmental good practice for the whole of the UK. GPP will replace the Pollution Prevention Guidelines (PPG) published by the Environment Agency, which have been withdrawn. Where they have not yet been replaced, the PPG still provide good practice advice. The GPP and PPG of particular relevance are:

- GPP 1: Understanding your environmental responsibilities – good environmental practices;
- GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer;
- GPP 5: Works and maintenance in or near water;
- PPG 6: Working at construction and demolition sites;
- GPP 20: Dewatering underground ducts and chambers;
- GPP 21: Pollution incident response planning; and
- GPP 22: Dealing with spills.

11.7.5. The OCoCP will also make reference to the Guidance for Pollution Prevention for businesses[61].

11.7.6. The OCoCP will contain construction method statements and work instructions for onsite staff that will inform them of the way that they should work to reduce the risk of polluting the surrounding environment. It will include instructions on dealing with certain situations such as general good site practices, adverse weather conditions, environmental incidents and complaints.

11.7.7. The OCoCP will detail procedures such as sediment and pollution management to prevent potential deterioration of the WFD status of surface water and groundwater features. The OCoCP will also describe the procedures in the event of an environmental emergency such as a fuel or chemical spillage.

11.7.8. Measures that are likely to be included in the construction method statements and work instructions for managing risks to the water environment and flood risk include:

- management of water that collects onsite or within excavations;
- management of polluting substances that are being brought onsite and used as part of the construction process;
- management of sediments in surface water runoff generated in construction areas and laydowns;
- management of accidental leakage and/or spillage incidents of oils/hazardous substances; and
- would be regular review of e the mitigation strategies implemented to best suit the practices being undertaken on the Site.

11.7.9. The following mitigation measures are likely to be required to minimise impacts to the water environment and flood risk due to the construction of the Proposed Scheme:

- Construction time for works within and in close vicinity to watercourses will be minimised as far as practical.
- Best practice construction (including dredging techniques) will be used.
- The design of the Proposed Jetty will minimise works in the river channel as far as practical.
- Preventing large amounts of earth from being washed away during periods of heavy rainfall through minimising areas of exposed surface (only removing vegetation when necessary) and keeping gradients as shallow as possible. Areas that are exposed should be reseeded or surfaced as soon as practicable.
- Measures to be put in place to prevent pollution from construction plant, vehicles and machinery include refuelling and lubricating in designated areas, on an impermeable surface, with appropriate cut-off drainage located away from watercourses; plant will be maintained in a good condition with wheel washing in place; all refuelling would be supervised and carried out in a designated area. In the event of plant breakdown drip trays would be used during any emergency maintenance and spill kits would be available onsite. Construction materials, such as cement, would be mixed in designated areas located away from water bodies and drainage lines.
- Concrete wash out would take place in designated concrete wash out areas.
- Surface water run-off and excavation dewatering would be captured and settled out prior to disposal in accordance with the relevant consent/permit requirements. Any contaminants would be removed prior to disposal.
- Incorporating hydrocarbon interceptors into the Site drainage system at high-risk areas, such as parking, unloading and refuelling areas, to remove hydrocarbons and oils from surface water prior to discharge.
- Drip trays would be used under equipment such as generators, and wheel washing facilities to minimise the risk of pollutants infiltrating groundwater or the surface water drainage network. Drip trays used for diesel pumps and standing plant would be regularly maintained to prevent leaks.
- Areas with a greater risk of spillage (e.g., vehicle maintenance and storage areas for hazardous materials) would be carefully sited (e.g., away from drains or areas where surface waters may pond).
- All drains within the Site would be identified and labelled and measures implemented to prevent polluting substances from entering them.
- Stockpiles/excavated materials would be stored in such a way to minimise silt laden runoff (e.g., by covering or seeding) and avoid increased sediment load within the drainage network.
- Provision of storage facilities and tanks, and machinery refuelling within bunded areas, which should, unless not reasonably practicable, be located further than 10m of water bodies or drainage systems.

- Storage areas for hazardous substances would be constructed with impervious floors and walls with the capacity equivalent to the contents of the storage tank and an additional 10% safety margin.

11.7.10. Dust management procedures as detailed in **Chapter 5: Air Quality (Volume 1)** would be implemented to minimise wind-blown contaminants entering watercourses.

11.7.11. Consideration will be given to potential effects that may arise through localised excavations or intrusive earthworks (e.g., piled foundations) on groundwater resources and aquifers and groundwater flooding risk. As design evolution is ongoing this will be considered accordingly within the ES. Reference will be made in the ES to the risks associated with such activities and measures that will be adopted to reduce/minimise the risk. Appropriate mitigation measures will be determined in consultation with the Environment Agency and other relevant stakeholders, such as LBB.

OPERATION PHASE

11.7.12. Relevant design, mitigation and enhancement measures will be identified in the ES, and these will likely include:

- Finished floor levels would, where practicable, be set at an appropriate level, including freeboard above the modelled breach flood level of the River Thames. Alternatively, any critical equipment could be raised above the breach flood level. Further information about finished floor levels will be provided within Chapter 2: Site and Proposed Scheme Description (Volume 1) of the ES.
- Any wastewater (as defined in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**) generated by the Proposed Scheme will be treated at the Wastewater Treatment Plant, as described in **Chapter 2: Site and Proposed Scheme Description (Volume 1).**
- Any liquid waste products including amine-based solvent will be managed appropriately, noting that any amine waste will be transported offsite to a specialist treatment plant. The method for treating the liquid waste products will be developed in consultation with the PLA and the Environment Agency as appropriate as the design progresses.
- The Proposed Scheme design will include appropriate drainage systems and attenuation, in consultation with and in accordance with the published requirements of the LLFA and Environment Agency (detailed in the Outline Drainage Strategy) and in line with the SuDS Manual[62].
- Any watercourses that would be lost as a result of the Proposed Scheme (potentially OW1 and OW7) are anticipated to be compensated for as required to ensure no loss of hydraulic capacity (potentially via widening of OW4). These watercourses are shown on **Figure 11-1: Surface Water Features (Volume 2)**.

- Water discharged to the water environment from the operation of the Proposed Scheme will be within the parameters set within an environment permit. A discharge into the Thames Water network would be within Thames Water's permit limits. The location/design of an outfall if required is detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** and **Chapter 3: Consideration of Alternatives (Volume 1).**
- All chemicals/potential contaminants to the water environment will be stored appropriately and in accordance with the relevant regulations.
- An EPRP (in accordance with the OEPRP) and OEMP would be developed and implemented should the defences breach or surface water flooding occur.

11.7.13. As design development progresses, any required additional measures would be incorporated into the Proposed Scheme to mitigate any unacceptable risk identified to any nearby (active) groundwater abstractions and groundwater flooding where potential/plausible risks from the Proposed Scheme have been identified. More information regarding the design, mitigation and enhancement measures are detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

11.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

11.8.1. This section details the preliminary assessment of impacts and effects of the Proposed Scheme during both the construction and operation phases, taking into account the effects of climate change embedded design, mitigation and enhancement measures detailed in **Section 11.7**.

11.8.2. The demolition of the Belvedere Power Station Jetty (disused) is likely to alter the local flow and therefore sediment regime although this change is unlikely to result in any significant change to the wider Thames Estuary. The impacts will be fully assessed in the proposed sediment transport modelling studies and confirmed in the ES. Associated impacts on marine biodiversity are covered in **Chapter 8: Marine Biodiversity (Volume 1)**.

Construction Phase

11.8.3. The likely potential significant effects for the water environment and flood risk associated with the construction phase are set out below in **Table 11-15**.

11.8.4. A conservative approach of the assessment of likely potential significant effects has been adopted based on design information available at the time of writing.

11.8.5. The construction assessment presented in this chapter is appropriate for both construction programme options, as set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1),** although this will be assessed and confirmed in the ES.

Table 11-15: Construction Phase Preliminary Assessment of Likely Significant Impacts

Receptor	Sensitivity of Receptor	Effect	Preliminary Magnitude of Impact	Preliminary Significance of Effect
River Thames	Very High	• Quality of surface water features (including the biological, physico-chemical and hydromorphological quality aspects). • Quantity of surface water features / flows. • Biological, physico-chemical and hydromorphological quality elements of the WFD designated water bodies (Thames Middle Water Body). • Breach of the River Thames flood defences. • Flood risk associated with the Proposed Jetty. • Flood risk to people.	Minor adverse	**Moderate Adverse (significant)**
River Thames	Very High	• Sediment Transport Regime.	This assessment will be presented in Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES.	
Marsh Dykes	Low to High	• Quality of surface water features (including the biological, physico-chemical and hydromorphological quality aspects). • Quantity of surface water features / flows. • Flooding from Marsh Dykes. • Loss of watercourse channel. • Flood risk to people.	Minor adverse	**Slight Adverse (not significant)**
Ponds	Low to Medium	• Quality of surface water features (including the biological, physico-chemical and hydromorphological quality aspects).	Minor adverse	**Slight Adverse (not significant)**

Receptor	Sensitivity of Receptor	Effect	Preliminary Magnitude of Impact	Preliminary Significance of Effect
Floodplain (associated with a breach of the River Thames flood defences)	High	• Quantity of surface water features / flows. • Breach of the River Thames flood defences. • Flood risk associated with the Proposed Jetty. • Flood risk to people.	Minor adverse	**Slight Adverse (not significant)**
Floodplain (associated with Marsh Dykes)	High	• Quantity of surface water features / flows. • Flooding from Marsh Dykes. • Loss of watercourse channel. • Flood risk to people.	Minor adverse	**Slight Adverse (not significant)**
Crossness LNR	High	• Quality of surface water features (including the biological, physico-chemical and hydromorphological quality aspects).	Minor adverse	**Slight Adverse (not significant)**
People (e.g. site visitors and staff and users of adjacent third party sites / land)	High	• Breach of the River Thames flood defences. • Flooding from Marsh Dykes. • Flood risk associated with the Proposed Jetty. • Surface water flooding. • Groundwater flooding. • Flooding from artificial sources. • Flood risk to people.	Minor adverse	**Slight Adverse (not significant)**

Receptor	Sensitivity of Receptor	Effect	Preliminary Magnitude of Impact	Preliminary Significance of Effect
Thanet Sand and Lambeth Group (bedrock) Secondary A aquifer	Medium	• Groundwater quality and quantity (level and flow) of on the Thanet Sand and Lambeth Group (bedrock) Secondary A bedrock aquifers (Lambeth Group including Thanet Sand Formation) and Alluvium (superficial deposit aquifers designated Secondary (undifferentiated and Secondary A aquifers (Alluvium, Head Deposits and Taplow Gravel Member).	Moderate Adverse	**Moderate Adverse (significant)**
Superficial deposit aquifers designated Secondary Undifferentiated aquifers (Alluvium and Head Deposits) and Secondary A aquifer (Taplow Gravel Member)	Medium	• Groundwater quality and quantity (level and flow) of on the Thanet Sand and Lambeth Group (bedrock) Secondary A bedrock aquifers (Lambeth Group including Thanet Sand Formation) and Alluvium (superficial deposit aquifers designated Secondary (undifferentiated and Secondary A aquifers (Alluvium, Head Deposits and Taplow Gravel Member).	Moderate Adverse	**Moderate Adverse (significant)**

Operation Phase

11.8.6. The likely potential significant effects for the water environment and flood risk associated with the operational phase are set out below in **Table 11-16**.

11.8.7. A conservative approach of the assessment of likely potential significant effects has been adopted based on design information available at the time of writing.

Table 11-16: Operational Phase Preliminary Assessment of Likely Significant Impacts

Receptor	Sensitivity of Receptor	Effect	Preliminary Magnitude of Impact	Preliminary Significance of Effect
River Thames	Very High	• Quality of surface water features (including the biological, physico-chemical and hydromorphological quality aspects). • Quantity of surface water features / flows. • Biological, physico-chemical and hydromorphological quality elements of the WFD designated water body (Thames Middle Water Body). • Breach of the River Thames flood defences. • Flood risk associated with the Proposed Jetty. • Flood risk to people.	Minor Adverse	**Moderate Adverse (significant)**
River Thames	Very High	• Sediment Transport Regime.	This assessment will be presented in Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES.	
Marsh Dykes	Low to High	• Quality of surface water features (including the biological, physico-chemical and hydromorphological quality aspects). • Quantity of surface water features / flows. • Flooding from Marsh Dykes. • Loss of watercourse channel. • Flood risk to people.	Minor Adverse	**Slight Adverse (not significant)**

Receptor	Sensitivity of Receptor	Effect	Preliminary Magnitude of Impact	Preliminary Significance of Effect
Ponds	Low to Medium	• Quality of surface water features (including the biological, physico-chemical and hydromorphological quality aspects).	Negligible	**Neutral (not significant)**
Floodplain (associated with a breach of the River Thames flood defences)	High	• Quantity of surface water features / flows. • Breach of the River Thames flood defences. • Flood risk associated with the Proposed Jetty. • Flood risk to people.	Minor adverse	**Slight Adverse** (**not significant**)
Floodplain (associated with Marsh Dykes)	High	• Quantity of surface water features / flows. • Flooding from Marsh Dykes. • Flood risk to people.	Minor adverse	**Slight Adverse** (**not significant**)
Crossness LNR	High	• Quality of surface water features (including the biological, physico-chemical and hydromorphological quality aspects).	Minor adverse	**Slight Adverse** (**not significant**)
People (e.g. site visitors and staff and users of adjacent third party sites / land)	High	• Breach of the River Thames flood defences. • Flooding from Marsh Dykes. • Flood risk associated with the Proposed Jetty. • Surface water flooding. • Groundwater flooding. • Flooding from artificial sources. • Flood risk to people.	Minor adverse	**Slight Adverse** (**not significant**)

Receptor	Sensitivity of Receptor	Effect	Preliminary Magnitude of Impact	Preliminary Significance of Effect
Thanet Sand and Lambeth Group (bedrock) Secondary A aquifer	Medium	• Impacts to groundwater flows and levels on the Thanet Sand and Lambeth Group (bedrock) Secondary A aquifers and aquifer Alluvium (superficial deposit aquifers designated) Secondary Undifferentiated and Secondary A aquifers (Alluvium, Head Deposits and Taplow Gravel Member, respectively). • Groundwater quality of the superficial and bedrock aquifers.	Moderate Adverse	**Moderate Adverse (significant)**
Superficial deposit aquifers designated Secondary Undifferentiated aquifers (Alluvium and Head Deposits) and Secondary A aquifer (Taplow Gravel Member)	Medium	• Impacts to groundwater flows and levels on the Thanet Sand and Lambeth Group (bedrock) Secondary A aquifers and aquifer Alluvium (superficial deposit aquifers designated) Secondary Undifferentiated and Secondary A aquifers (Alluvium, Head Deposits and Taplow Gravel Member, respectively). • Groundwater quality of the superficial and bedrock aquifers.	Moderate Adverse	**Moderate Adverse (significant)**

11.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

11.9.1. This section sets out the additional design, mitigation and enhancement measures relevant to the water environment and flood risk assessment.

11.9.2. The details of the required mitigation beyond the current design commitments is yet to be determined, however, it is expected that further mitigation identified as necessary will be incorporated into the design of the Proposed Scheme and the OCoCP.

Construction Phase

11.9.3. More detail of proposed measures will be incorporated into the ES once these have been defined; however, examples of potentially appropriate additional measures are as follows.

11.9.4. The following measures would be appropriate to design evolution:

- Lining of drainage features where there is an unacceptable risk of migration of contaminated runoff to underlying groundwater.

11.9.5. The following measures will be appropriate to the OCoCP:

- potential future sampling and removal of contaminated sediment if deposited in a sensitive area;
- control and treatment measures will be regularly inspected to ensure they are working effectively;
- local weather forecasts and River Thames water levels will be monitored and works scheduled accordingly- in particular, earthworks and in-stream works would be stopped during storm events; and
- emergency response plans will be developed, and spill kits made available onsite.

11.9.6. Measures in relation to potential effects from piled foundations and associated construction ground investigation are provided in **Chapter 17: Ground Conditions and Soils (Volume 1)**.

11.9.7. It is anticipated that a piling method which does not allow the *'dragging down'* of contaminants and does not create pathways from the near-surface soils to the aquifers shall be adopted where required depending onsite conditions. The precise solution will be discussed in the ES as further design information becomes available. The appropriate piling method will be determined following an assessment of the ground conditions (i.e., level and type of contamination present), in ES **Chapter 17: Ground Conditions and Soils (Volume 1)**, and where necessary through consultation and engagement with relevant stakeholders.

Operation Phase

11.9.8. No further additional design, mitigation or enhancement measures are proposed for water environment and flood risk at this stage but will be considered and confirmed as part of the ES as the design develops, in acknowledgement that there are likely significant adverse effects that have been identified at this preliminary stage.

11.10. MONITORING

11.10.1. There will be a requirement for monitoring of suspended sediment during the construction and operation phases of the Proposed Scheme to ensure that the dredging works described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** are appropriate. This will be assessed and identified in the ES.

11.10.2. Requirements for surface water and groundwater monitoring is subject to change and will be identified and reported in the ES.

11.11. RESIDUAL EFFECTS

11.11.1. **Table 11-17** below summarises the residual effects associated with the Proposed Scheme. It assumes that the mitigation set out in **Section 11.9** will be effective in reducing the anticipated effects.

Table 11-17: Water Environment and Flood Risk Summary of Residual Effects

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Construction Phase				
Quality of surface water features (including the biological, physico-chemical and hydromorphological quality aspects).	River Thames Marsh Dykes Ponds Crossness LNR	**Moderate Adverse (significant)**	Additional mitigation is outlined in **Section 11.9**, further measures will be identified for inclusion in the OCoCP as the design develops.	**Slight Adverse (not significant)**
Quantity of surface water features / flows.	River Thames Marsh Dykes	**Moderate Adverse (significant)**	Additional mitigation is outlined in **Section 11.9**, further measures will be identified for inclusion in the OCoCP as the design develops.	**Slight Adverse (not significant)**
Groundwater quality and quantity (level and flow) of the Secondary A bedrock aquifers (Lambeth Group including Thanet Sand Formation) and superficial deposit aquifers designated Secondary (undifferentiated and Secondary A aquifers	Thanet Sand and Lambeth Group (bedrock) Secondary A aquifer. Superficial deposit aquifers designated Secondary Undifferentiated aquifers (Alluvium and Head Deposits) and Secondary	**Moderate Adverse (significant)**	Additional mitigation is outlined in **Section 11.9**, further measures will be identified for inclusion in the OCoCP as the design develops.	**Slight Adverse (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
(Alluvium, Head Deposits and Taplow Gravel Member.	A aquifer (Taplow Gravel Member)			
Biological, physico-chemical and hydromorphological quality elements of the WFD designated water bodies (Thames Middle Water Body and Greenwich Tertiaries and Chalk Groundwater Body).	River Thames	**Moderate Adverse (significant)**	Additional mitigation is outlined in **Section 11.9**, further measures will be identified for inclusion in the OCoCP as the design develops.	**Slight Adverse (not significant)**
Changes to the sediment transport regime.	River Thames	This assessment will be presented in Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES.		
Flood Risk: • **Breach of the River Thames flood defences;** • **Flooding from Marsh Dykes;** • **Loss of watercourse channel;** • **Flood risk associated with the Proposed Jetty;** • **Surface water flooding,** • **Groundwater Flooding;** • **Artificial sources; and** • **Flood risk to people.**	River Thames Marsh Dykes Floodplain (associated with a breach of the River Thames flood defences) Floodplain (associated with Marsh Dykes) People (e.g., site visitors and staff and users of adjacent third party sites / land)	**Moderate Adverse (significant)**	Additional mitigation is outlined in **Section 11.9**, further measures will be identified for inclusion in the OCoCP as the design develops.	**Slight Adverse (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Operational Phase				
Quality of surface water features (including the biological, physico-chemical and hydromorphological quality aspects).	River Thames Marsh Dykes Ponds Crossness LNR	**Moderate Adverse (significant)**	Additional mitigation measures will be identified as the design progresses in relation to the Outline Drainage Strategy for the Proposed Scheme.	**Slight Adverse (not significant)**
Quantity of surface water features / flows.	River Thames Marsh Dykes	**Moderate Adverse (significant)**	Additional mitigation measures will be identified as the design progresses in relation to the quantity of surface water features.	**Slight Adverse (not significant)**
Impacts to groundwater flows and levels on the Thanet Sand and Lambeth Group (bedrock) Secondary A aquifers and superficial deposit aquifers designated Secondary Undifferentiated and Secondary A aquifers (Alluvium, Head Deposits and Taplow Gravel Member, respectively).	Thanet Sand and Lambeth Group (bedrock) Secondary A aquifer. Superficial deposit aquifers designated Secondary Undifferentiated aquifers (Alluvium and Head Deposits) and Secondary A aquifer (Taplow Gravel Member)	**Moderate Adverse (significant)**	Additional mitigation measures will be identified as the design progresses in relation to groundwater quality, flows and levels.	**Slight Adverse (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Groundwater quality of the superficial and bedrock aquifers.	Thanet Sand and Lambeth Group (bedrock) Secondary A aquifer. Superficial deposit aquifers designated Secondary Undifferentiated aquifers (Alluvium and Head Deposits) and Secondary A aquifer (Taplow Gravel Member)	**Moderate Adverse (significant)**	Additional mitigation measures will be identified as the design progresses in relation to groundwater quality.	**Slight Adverse (not significant)**
Biological, physico-chemical and hydromorphological quality elements of the WFD designated water body (Thames Middle Water Body and Greenwich Tertiaries and Chalk Groundwater Body).	River Thames	**Moderate Adverse (significant)**	Additional mitigation measures will be identified as the design progresses in relation to WFD mitigation measures.	**Slight Adverse (not significant)**
Changes to the sediment transport regime.	River Thames	This assessment will be presented in Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES.		
Flood Risk: • **Breach of the River Thames flood defences;**	River Thames Marsh Dykes	**Moderate Adverse (significant)**	Additional mitigation measures will be identified as the design progresses in	**Slight Adverse (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
• **Flooding from Marsh Dykes;** • **Loss of watercourse channel;** • **Flood risk associated with the Proposed Jetty;** • **Surface water flooding,** • **Groundwater;** • **Artificial sources; and** • **Flood risk to people.**	Floodplain (associated with a breach of the River Thames flood defences) Floodplain (associated with Marsh Dykes) People (e.g., site visitors and staff and users of adjacent third party sites / land)		relation to flood risk, these will be detailed in the FRA.	

11.12. NEXT STEPS

11.12.1. Further work to be completed and included in the ES comprises:

- The water environment and flood risk assessment will be further developed and refined based on any relevant responses to the Statutory Consultation.
- The gaps in the assessment identified within this chapter (e.g., flood risk assessment, WFD assessment, sediment impacts) will be completed and outcomes confirmed within the ES.
- The detailed assessment within the ES will involve a review of the water environment and flood risk assessment presented in this chapter, based on further information as part of ongoing design development.
- Continued development of appropriate embedded and additional mitigation as necessary.
- A piling risk assessment (to inform the detailed design). If required a dewatering risk assessment will be prepared and appended, should dewatering be required.
- Groundwater level monitoring (to inform the detailed design).
- Development of a site-specific FRA including assessment of groundwater flooding risk.

11.13. LIMITATIONS AND ASSUMPTIONS

11.13.1. This section outlines the limitations, uncertainties, and assumptions made in undertaking the water environment and flood risk assessment reported in this chapter:

- This assessment has relied, in part, on data provided by third parties that are the most up-to-date available at the time of writing. No significant changes or limitations in these datasets (in space or time) have been identified that would affect the robustness of the assessment.
- Sheet piling required for construction (on land as part of the preliminary design) will be to a maximum depth of 12 mbgl founded within the Taplow Gravels Formation (superficial deposits) based on design information available at the time of writing.
- The Environment Agency have confirmed that the 2018 Thames Estuary Breach Assessment is the best available information, and no site specific or later information is available at the time of writing. Site specific hydraulic modelling will not be undertaken to inform the assessment of flood risk to the Proposed Scheme from the River Thames or the network of watercourses to the south of the Site Boundary.
- It is not proposed to undertake water quality sampling to inform the assessment of the effects of the Proposed Scheme on the quality of the surface water features, as the water discharged from the site will be in accordance with the Environment Agency/LBB requirements and/or the relevant permits.

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DECARBONISATION

CHAPTER 12: CLIMATE RESILIENCE

Cory Decarbonisation Project

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TABLE

12. CLIMATE RESILIENCE

12.1. INTRODUCTION

12.1.1. This chapter reports the preliminary assessment of the likely significant effects of climate change on the Proposed Scheme (rather than the effects of the Proposed Scheme on climate) during construction and operation and describes:

- relevant policy, legislation and guidance;
- consultation and engagement undertaken to date;
- the methodology for assessment;
- potential effects during the construction phase; and
- potential effects during the operational phase.

12.1.2. The preliminary assessment of the likely significant effects of the Proposed Scheme on climate are reported in **Chapter 13: Greenhouse Gases (Volume 1)**.

12.1.3. This chapter is intended to be read alongside **Appendix 12-1: In-combination Climate Change Impacts Assessment (Volume 3)**, to consider the extent to which climate change exacerbates an effect on an environmental receptor.

12.2. POLICY, LEGISLATION, AND GUIDANCE

12.2.1. The policy, legislation, and guidance relevant to the assessment of climate resilience for the Proposed Scheme is detailed in **Table 12-1**.

Table 12-1: Climate Resilience Summary of Key Policy, Legislation and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011[1]	Sets out the Government's policy for delivery of major energy infrastructure and is currently the primary basis for decision making of applications within the Planning Act 2008 regime. EN-1 at paragraph 4.8.5 advises that, as *"new energy infrastructure will typically be a long-term investment and will need to remain operational over many decades, in the face of a changing climate. Consequently, applicants must consider the impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of new energy infrastructure*".
Overarching National Policy	This Overarching National Policy Statement for Energy (EN-1) is part of a suite of draft NPSs issued by the Secretary of

Policy, Legislation or Guidance	Description
Statement (NPS) for Energy EN-1 2023[2]	State of DESNZ. It sets out the government's policy for delivery of major energy infrastructure and will likely replace the 2011 NPSs by the time the application for the Proposed Scheme is submitted. Section 4.9 highlights that applicants and the Secretary of State should take the effects of climate change into account when developing and consenting infrastructure. The Secretary of State should be satisfied that applicants for new energy infrastructure have taken into account the potential impacts of climate change using the latest UK Climate Projections and associated research and expert guidance to ensure they have identified appropriate mitigation or adaptation measures.
National Planning Policy Framework (NPPF) 2023[3]	The NPPF sets out the Government's planning policies for England and how these should be applied, with the following paragraphs relating to climate resilience: Guidance relating to ways to minimise vulnerability and improve resilience to climate change impacts is mainly set out in Section 14 "*Meeting the Challenge of Climate Change, Flooding and Coastal Change*". Within Paragraph 8, the document confirms that the purpose of the planning system is to contribute to the achievement of sustainable development, which includes economic, social and environmental dimensions.
The London Plan 2021[4]	The Spatial Development Strategy for Greater London setting out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policy GG6: Increasing Efficiency and Resilience requires that *"buildings and infrastructure are designed to adapt to a changing climate, making efficient use of water, reducing impacts from natural hazards like flooding and heatwaves, while mitigating and avoiding contributing to the urban heat island effect".*
The Bexley Local Plan 2023[5]	The Local Plan, adopted on 26th April 2023, positively plans for sustainable development across the Borough, including measures to address climate change. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. Policy SP14: Mitigating and adapting to climate change highlights

Policy, Legislation or Guidance	Description
	that London and southeast England *"is likely to suffer from some of the severest impacts of climate change in the UK".* Stating that *"approximately one quarter of the borough is at risk from tidal or fluvial flooding".* Policy SP14 states its support for projects that can deliver greenhouse gas reductions. Policy SP14 (i), aims "*to ensure that the recommendations of the TE2100 Plan are implemented in new and existing developments".*
Climate Change Adaptation: Policy Information 2021[6]	The policy paper lays emphasis on the role of climate adaptation to reduce negative consequences of climate change in the UK and gives a description of the initiatives by the UK government for building preparedness and improving resilience to climate change impacts. These include UK Climate Change Risk Assessment[7], National Adaptation Programme[8], Adaptation Reporting Power[9], UK Climate Projections 2018[10] and the UK Climate Resilience Programme[11].
Bexley's Environmental Sustainability Strategy 2011[12]	Outlines the London Borough of Bexley's responsibilities for environmental sustainability, contained in several strategies with *"Theme 1: Adaptation to and Mitigation of Climate Change"* providing the Council's view on climate resilience.
Bexley Climate Change Statement and Action Plan 2022-2026[13]	Commitment 1: Celebrate, Promote and Protect our Natural Environment of the Action Plan aims for new developments and supporting initiatives that contribute to mitigation and adaption to climate change to be encouraged.
London Environment Strategy 2018[14]	Seeking to make London resilient to severe weather and longer-term climate change impacts. The Strategy has an aim to develop, refine and monitor plans and indicators of London's resilience to severe weather and longer-term climate change impacts on flooding, heat risk and water pollution.
TE2100 Plan (2012)[15] [16]	The TE2100 Plan sets out recommendations for flood risk management for London and the Thames estuary through to the end of the century and beyond. The TE2100 Plan is a strategic plan for adapting to rising sea levels in the estuary. One of these aims is to "*protect and enhance the value of the Thames, its tidal tributaries and*

Policy, Legislation or Guidance	Description
	floodplain – deliver social, cultural and commercial benefits for communities and support resilient growth" (Aim B). Aim B is linked with Strategic Objective 5 of the TE2100 Plan: *"work together to develop community-led visions for future riversides – these will drive flood defence upgrade and identify where to deliver wider benefits*". The Proposed Scheme falls within the Thamesmead action zone of the TE2100 action plan - Policy 4 (P4) – Take further action to keep up with climate and land use change so that flood risk does not increase. The TE2100 Plan is due to be updated (as of May 2023) but had not been released during the time of writing.
South East Inshore Marine Plan 2021[17]	The South East Inshore Marine Plan area stretches from Felixstowe in Suffolk to west of Dover in Kent and incorporates the River Thames. The South East Inshore Marine Plan will help to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan area. Policies SE-CC-1 to SE-CC-3 relate to climate change: • SE-CC-1 states that "*proposals that conserve, restore or enhance habitats that provide flood defence or carbon sequestration will be supported. Habitats that provide flood defence and carbon sequestration contribute to natural resilience for coastal communities that are vulnerable to coastal erosion and change. SE-CC-1 requires proposals to manage impacts, enabling these important habitats to continue to provide this valuable service. Proposals that cannot avoid, minimise and mitigate or, as a last resort, compensate for significant adverse impacts, will not be supported*". • SE-CC-2 states that *"effects of climate change are wide-ranging and can include sea level rise, coastal flooding and rising sea temperatures. SE-CC-2 adds provision to enable enhanced resilience of developments, activities and ecosystems within the south east inshore marine plan area to the effects of climate change and coastal change".* • SE-CC-3 states that proposals should not "*exacerbate coastal change, enabling communities to be more resilient and better able to adapt to coastal erosion and flood risk*

Policy, Legislation or Guidance	Description
	where identified. SE-CC-3 also supports proposals that do not compromise existing adaptation measures, which will enable an improvement in the resilience of coastal communities to coastal erosion and flood risk. Proposals that cannot avoid, minimise and mitigate significant adverse impacts will not be supported".
Legislation	
The Climate Change Act 2008, as amended 2019[18]	The Climate Change Act 2008 sets targets for reducing the UK's impacts on climate change and the need to prepare for its impacts. The Act requires a Climate Change Risk Assessment to be used to assess the risks from the impact of climate change to the UK. The first UK Climate Change Risk Assessment (CCRA) was presented to Parliament in an Evidence Report in 2012, with the second presented in 2017. The overall aim of the Evidence Report is to assess the urgency of further action to tackle current and future risks, and realise opportunities, arising for the UK from climate change. The Act also requires the production of a national adaptation plan for the UK Government to implement to be ready for the challenges of climate change.
Guidance	
National Planning Practice Guidance (2021)[19]	Explains the processes and tools that can be used through the planning system in England. The guidance advises how to identify suitable mitigation and adaptation measures in the planning process. This would require the implementation of appropriate measures by the local planning authorities. The guidance particularly recommends the use of local risk assessments to identify climate-related risks and their implications for the built environment, biodiversity and vulnerable groups and communities.
Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation 2020[20]	This guide sets out how to consider climate change resilience and adaptation in EIA reporting.

Policy, Legislation or Guidance	Description
Design Manual for Roads and Bridges LA 114 – Climate 2021[21]	This document establishes the requirements for assessing and reporting the effects of climate on highways. While the Proposed Scheme is not a highways project, the significance criteria assessment is Section 3 of LA114 provides a useful methodology which has been adopted within this assessment.

12.3. SCOPING OPINION AND CONSULTATION

12.3.1. An EIA Scoping Opinion[22] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26th May 2023. The responses from the Planning Inspectorate and statutory consultees in relation to climate resilience and how these requirements should be addressed by the Applicant are set out in **Table 12-2** below.

Table 12-2: Summary of the EIA Scoping Opinion in relation to Climate Resilience

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
The Planning Inspectorate			
3.8.1	Vulnerability assessment and use of this to define scope	*"The Scoping Report states that the vulnerability assessments presented in Tables 11-9 and 11-11 are used to define the scope of the ES, whereby a vulnerability is scoped out if it is assessed as low. Whilst the Inspectorate does not disagree with this method, no evidence or criteria is provided within these tables to justify the conclusions of low, medium or high sensitivity, exposure and consequently the requirement to scope these in or out. Specifically, the Ancillary Infrastructure lists 9 sources of medium to high vulnerability, whereas the main carbon capture and hydrogen production lists only 6, and no information is given as to why ancillary structures are considered to be more vulnerable. The ES should provide further detail on the assessment methodology used and justification for the scoping out of selected vulnerabilities."*	There is no prescribed standard or guidance on the methodology for scoping climate resilience for EIA. As outlined in Paragraph 11.7.2 in Chapter 11: Climate Resilience of the EIA Scoping Report[23], the IEMA Guidance[20] notes that scoping should identify the key climatic variables relevant to the Proposed Scheme. DMRB LA 114[21] provides further guidance, indicating that EIA Scoping should focus on the identification of any likely potential significant climate changes and likely exposure of the Proposed Scheme to these changes, to identify vulnerable elements that will require further assessment in the ES. Although DMRB LA 114[21] is used to understand the requirements for assessing and reporting the effects of climate on transport infrastructure, the methodology is applicable to other developments. The bullet points under Paragraph 11.7.3 in Chapter 11: Climate Resilience of the EIA Scoping Report[23] provide the methodology and criteria for assigning sensitivity and exposure ratings, whereby the level of sensitivity is determined by considering the impact of the climate on specific receptors, predominantly based on literature reviews and professional judgement and

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			rated as high, medium or low. The level of exposure is based on current climate and the future climate projections identified in the baseline information and rated as high, medium or low. Chapter 11: Climate Resilience of the EIA Scoping Report[23] (Paragraphs 11.7.6 to 11.7.16) presents a summary of the sensitivity of the Proposed Scheme's receptors to climate variables. This information is used to assign a sensitivity score during the vulnerability assessment. The future baseline, presenting climate projections, was detailed in Paragraphs 11.3.16 to 11.3.27 of Chapter 11: Climate Resilience of the EIA Scoping Report[23]. The climate projections are used to inform the exposure element of the vulnerability assessment. The number of low, medium or high ratings assigned per climate variable and receptor is a function of the sensitivity and exposure rating, as defined within the matrix presented in Table 11-7 in Chapter 11: Climate Resilience of the EIA Scoping Report[23]. Each climate variable for each receptor is assessed individually to assign the vulnerability score. The number of medium or high ratings per receptor should not be compared directly given that the assessment is made per variable and per receptor.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			The vulnerability assessment is undertaken only at scoping stage, with the ES stage assessing likelihood and consequence of climate change impacts on the receptors. Therefore, the rationale behind the vulnerability assessment has been explained here, as the ES chapter will not provide further explanation of the vulnerability assessment methodology. Ancillary Infrastructure has more vulnerability scores of 'medium' to 'high' compared to the Carbon Capture Facility as the Ancillary Infrastructure is deemed more sensitive to changes in annual averages (precipitation and temperature) and drought. Ancillary Infrastructure covers a wider area, including roads and drainage, which is more likely to be affected by these climate variables – e.g., Ancillary Infrastructure is more sensitive to risk of overheating, damage to ground infrastructure and blockage of drainage infrastructure which will not affect the Carbon Capture Facility as significantly.
3.8.2	Climate impacts during construction	*"Based on the short duration of construction works, the Inspectorate is in agreement that climate impacts during construction can be scoped out of the assessment for all identified receptors, with the exception of sea level rise and associated impacts. As noted in the Environment Agency's scoping consultation*	Sea level rise (SLR) and associated impacts have been preliminary assessed for the construction and operation phase in this PEIR and will be further considered in the ES.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		response (Appendix 2 of this Opinion), sea level rise and associated impacts are required to be scoped in for the construction phase to account for the TE2100 plan and associated works."	
3.8.3	Other climate impacts during operation	*"The Scoping Report confirms in the second row of Table 11-12 that impacts from flooding, extreme temperature events, gales/ winds, storms and sea level rise/ storm surges during operation are scoped into the assessment. On this basis and taking into account the vulnerability assessment, the Inspectorate is in agreement that all other climate impacts during operation can be scoped out of the assessment.*	No response required.
3.8.4	Relative humidity – all receptors	*"Based on the vulnerability assessment, the Inspectorate is in agreement that relative humidity can be scoped out of the assessment for all identified receptors."*	No response required.
3.8.5	Current baseline data sources	*"Paragraph 11.3.1 of the Scoping Report states that data is available from 1981 – 2010. The ES should confirm whether more recent data is available, in particular in relation to the noted increase in extreme climate events since this dataset."*	The current baseline climate data has been updated from the 1981-2010 projections to the most recent available projections (1991-2020). Recent past extreme weather events have also been updated using Met Office records and research of locally documented cases.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.8.6	Assessment methodology	*"The Scoping Report provides an outline description of the "RCP8.5" (high emissions scenario), however no information is given in relation to the background, use or relevance of this methodology or any alternatives. The ES should provide a detailed methodology for the assessment and ensure that any acronyms are defined in full within the ES."*	The use of RCP8.5 aligns with the IEMA Guidance[20]. RCP8.5 considers the high emissions scenario where a change in temperature of 4°C by 2100 is considered and combines assumptions about high population and relatively slow income growth with modest rates of technology change and energy intensity improvements. The approach is considered to represent a 'worst-case' scenario aligning with the overall EIA assessment approach. Further background is provided within this technical chapter and will be presented in the ES.
3.8.7	Terminology	*"Table 11-1 of the Scoping Report interchangeably uses the terminologies medium and moderate. The ES should use consistent language and terminology within each individual chapter."*	Terminology has been clarified throughout this technical chapter.
3.8.8	Consequences and likelihood definition	*"It is not clear within the Scoping Report as to whether there is a link within the methodology between the vulnerability assessment presented in Tables 11-9 and 11-11 and the assessment of consequences presented in Tables 11-13 and 11-14. The ES should clearly detail the methodology used."*	The vulnerability assessment is used at scoping stage to identify the climate variables to be taken forward to the PEIR and ES. The outcome of the vulnerability assessment was detailed in Table 11-9 and Table 11-11 in Chapter 11: Climate Resilience of the EIA Scoping Report[23]. The proposed assessment methodology (Section 11.8 in Chapter 11: Climate Resilience of the Scoping Report[23]) outlines the methodology that will be used for this PEIR and the

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			ES. In summary, following the vulnerability assessment completed at scoping, the next stage is to consider the consequence and likelihood of the climate impact on the receptors, as determined by the criteria set out in Table 11-13 and Table 11-14 of Chapter 11: Climate Resilience of the EIA Scoping Report[23]. These definitions relate to the assessment that has been undertaken as part of this PEIR and will be undertaken as part of the ES. **Section 12.4** of this technical chapter details the methodology used.
3.8.9	Definition of significance	*"The Scoping Report indicates that the climate assessment will only categorise effects as significant or not significant. No explanation is given as to why this chapter deviates from the overarching methodology to define significance of effect as, for example, negligible or moderate. The ES should present a justification of this methodology with reference to guidance where relevant."*	The climate resilience assessment considers the impact of climate on the Proposed Scheme, rather than the impact that the Proposed Scheme will have on the environment, as is typically assessed in other technical topics. Given the nature of the climate resilience assessment, the overarching methodology to define significance of effect is not suitable, and therefore not used. The assessment methodology and criteria for determining likelihood, consequence and significance of effect is presented in **Section 12.4**, and will align to good practice guidance, such as the IEMA Guidance[19] and DMRB LA 114[21].

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Environment Agency			
Climate Resilience	SLR and tidal flood risk	*"Table 11-1: Climate Resilience – Summary of Key Policy, Legislation and Guidance"* *"The issue of sea level rise (SLR) and the need to address the Thames Estuary 2100 plan has not been included here."* *"11.3.11 and 11.3.12 is not a sound description of the issue of sea level rise and tidal flood risk at this location. The sea level risk needs to be managed by uprating the Thames Tidal Flood Defences including raising the crest level of the flood defences within the site boundary, not by the open channels and pumped and gravity outfalls."* *"Table 11-9 and 11-10:* • *SLR considered in operation but not construction phase (which is 5 years).* • *SLR needs to be considered at construction phase to account for TE2100 Plan and raisings as required. Within this there should be consideration of adequate strength for raising and a design life commensurate with the development i.e., 75 years for non-residential development.*	The Thames Estuary 2100 Plan[15] has been included in **Section 12.2** of this PEIR. Sea level rise (SLR) has been preliminary assessed for the construction and operation phase in this PEIR and will be further considered in the ES. Further comments made by the Environment Agency regarding SLR are responded to in **Chapter 11: Water Environment and Flood Risk (Volume 1)**.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		• *SLR should not be scoped out for construction or operation for any receptors."* *"Application should consider:* • *TE2100 Plan* • *London Plan SI12* • *Bexley Local Plan 2023 is POLICY DP19 1. e. 5.8"*	

12.3.2. No consultation has been undertaken to inform the assessment of climate resilience to date.

12.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

12.4.1. The climate resilience assessment of the Proposed Scheme has been undertaken in line with the legislation, policy and guidance described in **Section 12.2**.

POTENTIAL SIGNIFICANT EFFECTS

12.4.2. As identified in the EIA Scoping Report[23] and in response to the EIA Scoping Opinion[22], the following were identified as having a medium or high vulnerability to the climate and have been considered further in this assessment:

- Construction Phase:
  - Construction Site & Staff, Construction Materials and Plant & Equipment (including the Temporary Construction Compounds) will be vulnerable to sea level rise, storm surge and storm tide as per the Scoping Opinion.
- Operation Phase:
  - The operation of the Carbon Capture Facility will be vulnerable to extreme precipitation events (flooding), extreme temperature events, gales and high winds and storms, and sea level rise, storm surge and storm tide.
  - The Proposed Jetty will be vulnerable to extreme temperature events, gales and high winds and storms, and sea level rise, storm surge and storm tide.
  - The Ancillary Infrastructure will be vulnerable to changes in annual average precipitation, extreme precipitation events (flooding), drought, changes in annual average temperature, extreme temperature events, gales and high winds, storms, sea level rise, storm surge and storm tide.
  - End users (operational staff) will be vulnerable to extreme precipitation events (flooding), extreme temperature events, gales and high winds, storms, sea level rise, storm surge and storm tide.
  - The Mitigation Areas will be vulnerable to changes in annual average precipitation, extreme precipitation events (flooding), extreme temperature events, sea level rise, storm surge and storm tide.

MATTERS SCOPED OUT

12.4.3. The following are considered unlikely to be vulnerable to climate hazards and therefore have not been considered further in this assessment:

- Construction Phase:
  - No receptors are considered likely to be vulnerable to all climate hazards identified, excluding sea level rise (as per the EIA Scoping Opinion).

- Operation Phase:
  - The operation of the Carbon Capture Facility was assessed as having low vulnerability to change in annual average precipitation, drought, change in annual average temperature, change in annual average relative humidity and evaporation.
  - The operation of the Proposed Jetty was assessed as having low vulnerability to change in annual average precipitation, drought, change in annual average temperature, change in annual average relative humidity and evaporation.
  - Ancillary Infrastructure was assessed to have low vulnerability to relative humidity (change in annual average and/or evaporation).
  - Ancillary Equipment (now included under 'Ancillary Infrastructure', further explained in **Section 12.4.6**) was assessed to have low vulnerability to change in annual average precipitation, drought, change in annual average temperature, change in annual average relative humidity and evaporation.
  - Operational Staff were assessed to have low vulnerability to change in annual average precipitation, drought, change in annual average temperature, change in annual average relative humidity and evaporation.

SENSITIVE RECEPTORS

12.4.4. The sensitive receptors are the components of the Proposed Scheme that are likely to be impacted by changes in climate variables.

12.4.5. The following sensitive receptors have been identified:

- Construction Phase:
  - site (including the Temporary Construction Compounds);
  - staff;
  - materials; and
  - plant and equipment.
- Operation Phase:
  - Carbon Capture Facility;
  - Proposed Jetty;
  - Ancillary Infrastructure;
  - Mitigation Area; and
  - End users (operational staff).

12.4.6. In the EIA Scoping Report[23], Ancillary Infrastructure and Equipment were identified as two separate receptors. These receptors have been combined under 'Ancillary Infrastructure' to align with **Chapter 2: Site and Proposed Scheme Description (Volume 1)**. Where a certain element of the receptor is more vulnerable to the effects of climate change than another under that receptor classification, the highest vulnerability score will be applied in the consequence assessment. For example, if the mains electrical infrastructure is classed as having a 'low' vulnerability to drought, whereas potable water supply is classed as 'medium' vulnerability, the overall vulnerability score will be 'medium'. Where medium and high vulnerabilities have been identified, the climate hazards and receptors are brought into the PEIR and ES for further assessment of the associated impacts, using the likelihood and consequence criteria.

12.4.7. **Chapter 2: Site and Proposed Scheme Description (Volume 1)** provides further information on the construction and operation phases of the Proposed Scheme.

BASELINE DATA COLLECTION

12.4.8. A desk-based data collection exercise has been undertaken, including review of available information to determine the baseline conditions that are relevant to this preliminary assessment.

12.4.9. The key sources of information used to determine the baseline and future baseline climate conditions are:

- Met Office records[25]; and
- the UKCP18 projections[10].

12.4.10. As detailed in **Table 12-2**, the current baseline climate data has been updated from the 1981-2010 projections to the most recent available projections (1991-2020). Recent past extreme weather events have also been updated using Met Office records and research of locally documented cases.

12.4.11. No site survey or consultation will be required to inform the assessment of the resilience of the Proposed Scheme to climate change impacts.

ASSESSMENT METHODOLOGY

12.4.12. The climate resilience assessment looks at the potential impacts of climate change on the Proposed Scheme, rather than impacts of the Proposed Scheme on climate; the sensitive receptors for the climate resilience assessment are components of the Proposed Scheme (as detailed above). As such, no assessment of intra-project combined effects is undertaken, as there are no receptors in common with other assessments.

12.4.13. The climate resilience assessment for the construction and operation phases has been undertaken using the 'likelihood-consequence' approach based on the IEMA Guidance[24], DMRB LA 114[21] and professional judgement.

12.4.14. The significance of effects has been determined by considering the consequence and likelihood of potential impacts, associated with changes in climate variables, on the Proposed Scheme components. Likelihood and consequence were qualitatively assessed using the descriptions in **Table 12-3** and **Table 12-4**, informed by the existing and projected baseline. The likelihood definitions depend on the lifetime of the Proposed Scheme's components (as highlighted in **Table 12-3**) and therefore will vary. **Table 12-3** describes the frequency that the climate event may occur, based on the future climate projections. The timeframe referenced relates to the design life for the Proposed Scheme (50 years), as described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

12.4.15. **Table 12-4** describes the potential consequence that the climate impact may have on a given sensitive receptor.

12.4.16. These descriptions have been developed using professional judgement, informed by relevant guidance.

Table 12-3: Likelihood Definitions

Measure of Likelihood	Description
Very High	The event occurs multiple times during the lifetime of the Proposed Scheme; e.g., approximately annually.
High	The event occurs several times during the lifetime of the Proposed Scheme; e.g., approximately once every five years.
Medium	The event occurs limited times during the lifetime of the Proposed Scheme; e.g., approximately once every 10 years.
Low	The event occurs occasionally during the lifetime of the Proposed Scheme; e.g., once in 20 years.
Very Low	The event may occur once during the lifetime of the Proposed Scheme.

Table 12-4: Measure of Consequence Definitions

Measure of Consequence	Description
Negligible	No infrastructure damage, minimal adverse impacts on health, safety and the environment or financial loss. Little change to service and disruption lasting less than one day.
Minor	Localised infrastructure disruption or loss of service. No permanent damage, minor restoration work required, disruption lasting less than one day. Small financial losses and/or slight adverse health or environmental impacts.
Moderate	Limited infrastructure damage and loss of service with damage recoverable by maintenance or minor repair. Disruption lasting more than one day but less than one week. Moderate financial losses. Adverse impacts on health and/or the environment.
Large	Extensive infrastructure damage and severe loss of service. Disruption lasting more than one week. Early renewal of infrastructure 50-90%. Permanent physical injuries and/or fatalities. Major financial loss. Adverse impacts on the environment, requiring remediation.
Very Large	Permanent damage and complete loss of service. Disruption lasting more than one week. Early renewal of infrastructure >90%. Severe health effects and/or fatalities. Extreme financial loss. Very large adverse loss to the environment requiring remediation and restoration.

12.4.17. The assessment of likelihood and consequence takes embedded mitigation into account as an assumed part of the design. At the time of writing the PEIR, not all embedded mitigation measures have been confirmed. As such, this PEIR includes some embedded mitigation and further measures will be included in the ES to address other climate variables, where appropriate.

SIGNIFICANCE CRITERIA

12.4.18. The likelihood and consequence are combined to assess the significance of effects on sensitive receptors, as shown in **Table 12-5**. The assessment is qualitative and based on expert judgment from knowledge of similar schemes and a review of relevant literature.

Table 12-5: Climate Resilience Significance Rating Matrix

Measure of Consequence of Hazard Occurring	Measure of likelihood				
	Very low	Low	Medium	High	Very high
Very large	Not significant	Significant	Significant	Significant	Significant
Large	Not significant	Not significant	Significant	Significant	Significant
Moderate	Not significant	Not significant	Significant	Significant	Significant
Minor	Not significant	Not significant	Not significant	Not significant	Not significant
Negligible	Not significant	Not significant	Not significant	Not significant	Not significant

12.5. STUDY AREA

12.5.1. The scope for the climate resilience assessment relates to the impact of climate on the Proposed Scheme (rather than the impact of the Proposed Scheme on climate). As such, the Study Area for the Proposed Scheme is the Site for both the construction and operation phases.

12.6. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

12.6.1. The IEMA Guidance[20], identifies the need for the baseline to consider the:

- current climate baseline (defined by historic climate conditions) to provide an indication of past vulnerability; and
- future climate baseline (short-term extremes and long-term variation) to assess the Proposed Scheme's vulnerability to climate change.

12.6.2. The current baseline for the climate resilience assessment is based on historic climate data obtained from the Met Office records for the closest meteorological station to the Proposed Scheme (Greenwich Park, approximately 11 km west of the Proposed Scheme) for the period 1991-2020[25] and Met Office Regional Climate Profiles [26]. The climate projections which originally looked at the 1981-2010 dataset have been updated to the most recent available projections (1991-2020).Table 12-2 The Site is located in the Met Office Regional climate profile of Southern England. Where flood risk information gathered and presented in the ES for Riverside 2[27] is relevant to the Proposed Scheme, this will be used to support the climate baseline.

UK Context

12.6.3. According to the latest State of the UK Climate Report 2022[28]:

- The observations show that in the UK extremes of temperature are changing much faster than the average temperature.
- 40°C was recorded in the UK for the first time during a heatwave which exceeded previous records by a large margin. The UK's record warm year of 2022 and unprecedented July heatwave were both made more likely by climate change.
- 2022 was the warmest year in the UK series from 1884, 0.9°C above the 1991–2020 average. It was the first year to record a UK annual mean temperature above 10°C. All the top-10 warmest years for the UK in the series from 1884 have occurred in this century.
- Cooling degree days (CDD)[a] are dominated by annual variability, however, for England, the most recent decade (2013–2022) has had seven more CDD than 1991–2020 and 15 more than 1961–1990, the latter representing a doubling over this period.
- For the most recent decade (2013–2022), UK winters have been 10% wetter than 1991–2020 and 25% wetter than 1961–1990.
- In recent years, widespread and substantial snow events have occurred in 2021, 2018, 2013, 2010 and 2009, but their number and severity have generally declined since the 1960s.
- The UK annual mean wind speed from 1969 to 2022 shows a downward trend, consistent with that observed globally.
- Over the past 30 years (1993–2022) the sea level has risen by 11.4 cm. The rate of sea-level rise is increasing.
- The most widespread storm surges of 2022 came with Storm Eunice on 18 February, with the northern Irish Sea witnessing over 1 m skew surges.
- The period January–August 2022 was the driest across England and Wales since 1976, with drought status declared across parts of England and all of Wales.

Local Climate

12.6.4. **Table 12-6** provides an understanding of how recent climate trends have impacted the Study Area for a range of climate variables (temperature, rainfall and windspeed). The local, regional and UK context (Greenwich Park Weather Station, Southern England, and the UK) is presented to understand how the local climate compares to the regional and local baseline.

[a] Cooling Degree Days are the day-by-day sum of number of degrees by which the mean temperature is more than 22°C. CDD indicate the energy demand for cooling due to hot days. A higher number of CDD means an increase in power consumption for cooling and air conditioning, therefore this index is useful for predicting future changes in energy demand for cooling.

Table 12-6: Climate trends for 1991-2020 for Greenwich Park Weather Station, Southern England and the UK

Climate Variable	Greenwich Park Weather Station	Southern England	UK
Mean Annual Temperature (°C)	11.9	10.4	9.1
Mean Winter Temperature (°C)	6.1	4.9	4.1
Mean Summer Temperature (°C)	18.1	16.2	14.6
Maximum Summer Temperature (°C)	22.8	21.0	19.0
Highest Monthly Maximum Temperature - July (°C)	23.7	21.8	19.6
Minimum Winter Temperature (°C)	3.4	1.9	1.3
Lowest Monthly Minimum Temperature - January (°C)	3.4	1.9	1.2
Days of air frost (days)	23.1	41.9	53.4
Mean Annual Rainfall (mm)	563	808	1163
Mean Winter Rainfall (mm)	134	224	345
Mean Summer Rainfall (mm)	139	187	253
Highest Monthly Rainfall - November [b](mm)	60	87	123
Days of rainfall ≥1 mm (days)	106	129	159
Sunshine hours (hours)	1526	1594	1403
Monthly mean windspeed at 10m (knots)	--	8.0	9.3

Humidity

12.6.5. The relative annual average humidity at the Proposed Scheme is 78 to 80% and slightly higher in the surrounding areas of Greater London (80 to 82%)[25]. This is because the Proposed Scheme is in Greater London, and cities often have lower humidity due to reduced evapotranspiration from vegetation and increased run-off of precipitation.

[b] Across the 1991-2020 time period, November, on average, was the month that received the highest rainfall.

Sea Level Rise

12.6.6. The Proposed Scheme falls within the Thamesmead Policy Unit, identified in the TE2100 Plan[15] Action Zone 4, an area that is low lying, with ground levels typically 2m to 3m below high water on spring tides. Flood depths in a surge tide event overtopping or breaching the defences could exceed 5m in an extreme event. The Site is therefore highly vulnerable to tidal flood risk[29].

12.6.7. The Environment Agency Flood Map for Planning[30] presents the flood risk associated with the Study Area. The map indicates that the Study Area is located within Flood Zone 3 and is within the possible tidal flood extent of the 1 in 200-year event (0.5% Annual Probability of Exceedance event), excluding the presence of flood defences. However, there are EA maintained flood defences located along the River Thames, parts of which are within the Study Area. These currently provide the Site with a reduction in local flood risk.

12.6.8. The Site is located within an area benefitting from flood defences, with a standard protection of 1 in 1,000 years (0.1% annual probability). Risks are managed through fluvial flood management that is provided by a system of open channels with pumped and gravity outfalls into the River Thames and tidal flood risk is managed by the River Thames tidal defences downriver.

12.6.9. In February 2018, the upper Thames River watershed experienced a significant flood event. Flows reached record highs at various monitoring stations. Operations at the Upper Thames River Conservation Authority's (UTRCA) three flood control dams combined to reduce flows by nearly 30% on the Thames River at Byron station[31]. In July 2023, a flood warning was provided for the River Thames from Thamesmead to Woolwich Arsenal.

Past Major Climate Events

12.6.10. Examples of past severe weather events in the region are provided below to present an indication of past climate hazards:

- December 2022 saw a prolonged spell of low temperatures, with snow and icy conditions disrupting road and rail travel in London.
- Flash flooding in October 2022 meant some areas saw a month's worth of rain in a day. Multiple roads were closed, including the M25, with tube and railway services also disrupted.
- In August 2022 - the Kent and South London Environment Agency Area was declared as in-drought. Southern England is prone to drought.
- In July 2022 the Met Office issued a red warning for extreme heat, which affected all Central and Southern England. The heatwave saw temperatures surpass 40°C for the first time in London and the UK's history. On 15th July 2022, a national emergency was declared after the red warning was put in place.

- Storm Eunice in February 2022 brought wind speeds reaching over 50mph in east London, leading to damage to the roof of the O2 stadium and a fatality in north London caused by a tree falling onto a car.
- In February 2018, snowfall from Storm Emma led to reduced train services, causing the London Overground and Transport for London (TfL) to suffer particularly badly. This type of disruption could affect working conditions and the ability of staff to get to and from the Proposed Scheme.

FUTURE BASELINE

12.6.11. The UKCP18[10] provide data on projected change in climate variables for the UK. The UKCP18[10] are the most up-to-date projections of climate change for the UK, providing projections until the end of the twenty-first century. The Climate Risk Indicators (CRI) developed as part of the UK Climate Resilience Programme has been used to inform the assessment approach[32]. The CRI utilises the UKCP18 projections[10] and allows for a range of climate related indicators (including, but not limited to, Met Office heatwaves and heat stress) to be assessed.

12.6.12. UKCP18 includes probabilistic projections of a range of climate variables for different emissions scenarios, termed representative concentration pathways (RCPs) and for a range of time slices to the end of the century. To address the full range of climate model uncertainty the results are provided as 50th (10th to 90th) percentiles and the estimate projections are presented against baseline levels of 1981-2010 (based on model data).

12.6.13. The RCP8.5 scenario has been used to inform this assessment. RCP8.5 is a high emissions scenario that combines assumptions about high population and relatively slow income growth with modest rates of technological change and energy intensity improvements. RCP8.5 is a pathway scenario where greenhouse gas emissions continue to grow unmitigated, leading to a best estimate global average temperature rise of 4.3°C by 2100. The use of RCP8.5 aligns to the IEMA guide[20] and is considered an appropriate 'worst-case' scenario.

12.6.14. The future baseline has been presented for the 2030s (2020-2049), the 2050s (2040-2069) and 2080s (2070-2099) to identify the anticipated climate conditions over the construction period and design life of the Proposed Scheme's sensitive receptors.

12.6.15. As the future baseline assessment is informed by the Bexley Local Authority area CRI data, the assessment area includes the existing commercial business within the Site, including Riverside 1 (which includes the Middleton Jetty) and Munster Joinery. Riverside 2 would also be operational in the future baseline.

12.6.16. **Table 12-7** provides an overview of current and projected summer and winter temperature and rainfall for the location of the Proposed Scheme. Within **Table 12-7** for SLR the closest marine projections are shown on **Figure 12-1: The Closest Marine Projections Data Point to the Proposed Scheme (Volume 2).**

Table 12-7: Future Climate Projections for the Model Reference (1981-2010), Current (1991-2020) and Future Climate (2030s, 2050s and 2080s) for RCP8.5 (Anomalies). Table shows the 50th Percentile (10th Percentile to 90th Percentile) Values

Climate Variable	Model Reference (1981-2010)	Current Baseline (1991-2020)	RCP8.5			Trend (50th Percentile)
			2030	2050	2080	
Mean Annual Temperature (°C)	11.	11.	+1.2 (0.5 to 1.8)	+2.1 (1.1 to 3.1)	+3.8 (2.1 to 5.7)	↑
Mean Summer Temperature (°C)	17.8	18.1	+1.5 (+0.7 to +2.4)	+2.7 (+1.3 to +4.3)	+5.1 (+2.7 to +7.8)	↑
Mean Winter Temperature (°C)	5.7	6.1	+1.0 (+0.1 to +1.9)	+1.7 (+0.7 to +2.9)	+3 (+1.3 to +4.9)	↑
Maximum Summer Temperature (°C)	22.5	22.8	+1.7 (0.7 to 2.9)	+3.1 (1.2 to 5.1)	+5.8 (2.5 to 9.3)	↑
Minimum Winter Temperature (°C)	3.1	3.4	+0.9 (0 to 2.0)	+1.7 (0.5 to 3.1)	+3.1 (1.1 to 5.3)	↑
Met office heatwave*[c] (events per year)	0.7	0.8	1.6 (1.0 to 2.5)	2.8 (1.4 to 4.3)	4.6 (2.8 to 6.0)	↑

[c] A UK heatwave threshold is met when a location records a period of at least three consecutive days with daily maximum temperatures meeting or exceeding the heatwave temperature threshold. The threshold for the local area is 25°C.

Climate Variable	Model Reference (1981-2010)	Current Baseline (1991-2020)	RCP8.5			Trend (50th Percentile)
			2030	2050	2080	
Heat stress*[d] (days per year)	0.2	0.3	1.2 (0.5 to 2.5)	3.5 (1.1 to 7.8)	11.9 (3.7 to 32.1)	↑
Frost days*[e] (days per year)	40.4	38.5	28.7 (21.5 to 36.6)	21.4 (13.4 to 30.5)	12.7 (6.1 to 23.8)	↓
Mean Annual Rainfall	557mm	563mm	-0.4% (-5.0% to +4.2%)	-2.5% (-9.0% to +4.4%)	-2.3% (-10.4% to +6.6%)	↓
Mean Winter Rainfall	126mm	134mm	+6.5% (-2.0% to +15.3%)	+10.6% (-0.9% to +23.6%)	+17.8% (+2.1% to +35.6%)	↑
Mean Summer Rainfall	136mm	139mm	-13.0% (-27.8% to +5.5%)	-21.2% (-41.8% to +0.5%)	-32.7% (-55.5% to -4.4%)	↓
SPEI Drought*[f] (proportion of time)	0.07	0.09	0.14 (0.08 to 0.21)	0.22 (0.11 to 0.31)	0.32 (0.16 to 0.42)	↑
Relative Humidity (%)	78-80	--	-2.2 (-3.3 to -1.8)	-3.6 (-4.9 to -3)	--	↓

[d] Days with shade Wet Bulb Globe Temperature (WBGT) above 25oC
[e] Days with minimum temperature below 0 °C.
[f] Time in drought defined as precipitation and potential evaporation. Standardised Precipitation Evaporation Index.

Climate Variable	Model Reference (1981-2010)	Current Baseline (1991-2020)	RCP8.5			Trend (50th Percentile)
			2030	2050	2080	
Wildfire events*[g] (days per year)	30.9	33.1	46.7 (33.3 to 64.0)	70.0 (38.0 to 85.2)	83.4 (50.2 to 113.2)	↑
Soil Moisture[h] (% change) – Winter / Summer	0	-0.3 / -2.0	-1.5 (-4.9 to +1.7%) / -11.6 (-19.9 to -7.0)	-1.7 (-6.7 to +1.0) / -18.2 (-25.9 to -12.3)	-2.9 (-6.6to +1.3) / -26.3 (-33.2 to -21.6)	↓
Sea level rise[i,j] (m)	N/A	N/A	+0.15 (+0.19)	+0.29 (+0.37)	+0.57 (+0.74)	↑

*absolute values

[g] Days with Met Office Wildfire Index at the Very High Fire Severity level or above.
[h] Potential soil moisture deficit measured by the maximum difference between accumulated rainfall and potential evaporation.
[i] Projections for SLR have been ascertained using UKCP18 marine projections for the closest location (Coastal Location latitude(N), longitude(E): 51.5, 0.58) to the Proposed Scheme, as shown on **Figure 12-1: The Closest Marine Projections Data Point to the Proposed Scheme (Volume 2).**
[j] These projections are based on closest marine projections available using the 50th and 90th percentile, and therefore will differ to sea level allowances that may be provided by **Chapter 11: Water Environment and Flood Risk (Volume 1)** as that assessment investigates a range of allowances for each river basin district using the 70th and 95th percentile.

Wind

12.6.17. UKCP18 depicts a wide spread of future changes in mean surface wind speed, however, there is considerable uncertainty in projected changes in circulation over the UK and natural climate variability contributes to much of this uncertainty. It is therefore difficult to represent regional extreme winds and gusts within regional climate models.

12.6.18. Central estimates of change in mean wind speed for the 2050s are small in all data simulations (<0.2ms-1). A wind speed of 0.2ms-1 (approximately 0.4 knots) is small compared with the typical magnitude of summer mean wind speed of about 3.6–5.1ms-1 (7 – 10 knots) over much of England. Seasonal changes at individual locations across the UK lie within the range of –15% to +10%.

Sea Level Rise

12.6.19. The Proposed Scheme may be impacted by sea level rise in the future, due to its location on the River Thames and within the tidal and fluvial flood zones. Fluvial, surface water and tidal flood risk is expected to increase consequent to the impacts of climate change that are predicted to result in: increased sea levels; greater tide locking; higher peak fluvial flows; and more intense rainfall events. The flood defences outlined in **Section 12.6** have an upper end sea level allowance for the South East and River Thames which ranges from 6.9mm to 18.2mm from year 2000 to 2125, with a cumulative rise of 1.6m[33].

12.6.20. The TE2100 Plan[15] includes various options to manage future flood risk. These options include: upgrading the existing Thames Barrier; flood storage and upgrade the existing Thame Barrier; new barrier with a single set of gates in Gravesend Reach; or a new barrier with a single set of gates in Long Reach[34]. It is projected that flood defences upstream (west) of the Thames Barrier need to be upgraded by 2050. In the vicinity of the Proposed Scheme, defences downstream (east) of the Thames Barrier need to be upgraded by 2040. This upgrade will help mitigate the Proposed Scheme from the potential effects of flood risk from sea level rise and its associated impacts.

Soil Erosion and Degradation

12.6.21. There are many factors which cause or worsen soil erosion, both natural and anthropogenically induced. These include slope angle, precipitation, soil texture, organic matter content of the soil, vegetation cover, human activity (e.g., construction, deforestation, agriculture), wind speed and intensity, and flood events. It was estimated in 2017 that every year, approximately 36 billion tonnes of fertile soil is lost due to erosion[35]. To put this into perspective, another study estimated this loss to be approximately 1% of the world's topsoil every year[36].

12.6.22. With regards to climate change influence on soil erosion, in drier regions (under the summer climate projections) we can expect climate change to result in more periods of drought and hence more wind erosion. In moister areas (under the winter climate projections) we may experience more intense precipitation events and hence more water erosion[37].

Shrink Swell

12.6.23. The British Geological Survey (BGS) identifies that the increased risk of clay shrink-swell due to climate change is likely for both the 2030s and the 2070s[38]. As a result of the projected warmer, drier summers, there is potential for increasing shrink-swell activity which can lead to subsidence.

12.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

12.7.1. **Table 12-8** sets out the embedded design, mitigation and enhancement measures relevant to the climate resilience assessment.

12.7.2. The design is evolving, and consequently, not all embedded design measures are confirmed at the time of writing this chapter. All embedded design measures will be noted where they are relevant to mitigating the effects of climate change within the ES.

Table 12-8: Climate Resilience Embedded Design, Mitigation and Enhancement Measures

Receptor	Climate Variable	Embedded Design, Mitigation and Enhancement Measures	Evidence of Commitment
Construction Phase			
• **Construction site (including Temporary Construction Compounds).** • **Staff.** • **Materials.** • **Plant and equipment.**	• Sea level rise. • Storm surge. • Storm tide.	• Measures for managing risk from these climate variables will be managed through the OCoCP which is to be submitted as part of the application for development consent. The OCoCP will be the mechanism that ensures the successful management of likely environmental risks during construction activities.	An OCoCP is to be submitted as part of the application for development consent. A Flood Risk Assessment (FRA) will be prepared in accordance with NPS EN-1 (2011)[39], NPS EN-1 (2023)[40] and the National Planning Policy Framework (NPPF)[41]. The FRA will assess the potential implications of the Proposed Scheme on flood risk to people and property elsewhere, as well as assess the potential risk of flooding to the Proposed Scheme. Implementation will be secured by DCO Requirement.
Operation Phase			
Carbon Capture Facility	• Extreme precipitation events (flooding).	• The Proposed Scheme will require a new drainage system within the Site. • The evolving drainage design will be designed such that the rate of surface water run-off leaving the Site and entering the adjacent	Outline Drainage Strategy, with pre-construction implementation secured by DCO Requirement. OEMP.

Receptor	Climate Variable	Embedded Design, Mitigation and Enhancement Measures	Evidence of Commitment
		watercourse network is limited to the 1 in 100 year greenfield rate of 35.3 l/s. • Surface water storage will be provided by a below ground tanked system with capacity to cater for a 1 in 100 year plus climate change (+40% increase in rainfall intensity) event. • The flood level data includes allowances for climate change, in accordance with Environment Agency requirements, and this data has been taken forward for the purposes of defining design levels for the Proposed Scheme. In respect of allowances for peak rainfall intensity (used to inform surface water drainage) the Proposed Scheme design has been based upon a 40% uplift in rainfall intensity, as required by LBB. • All operational area will be covered with hardstanding to prevent any mobilisation of pollutants. • Maintenance of the Proposed Scheme will be the responsibility of the Applicant, and will involve routine, planned maintenance and system checks, as well as reactive maintenance and repairs.	Inherent in the design of the Proposed Scheme as described in **Section 2.2** of **Chapter 2: Site and Proposed Scheme Description (Volume 1).**

Receptor	Climate Variable	Embedded Design, Mitigation and Enhancement Measures	Evidence of Commitment
		• The maintenance procedures will be set out in an Operational Environmental Management Plan (OEMP), which will be prepared prior to the Proposed Scheme commencing operation.	
	• Extreme temperature events.	• The design will be in accordance with the UK Building Regulations and BE EN codes. Where no BS EN code exists the Eurocodes and ISO standards will be adopted. The Site already carries out regular civil asset condition surveys via external consultants on framework agreement. The agreed survey frequency for the assets is in line with the condition and deterioration rates observed onsite. Proactive maintenance (details of which will be outlined in the ES) to address any defects is planned in line with the consultant's recommendations. It is expected that the assets for the Proposed Scheme will be similarly managed. • The maintenance procedures will be set out in an OEMP, which will be prepared prior to the Proposed Scheme commencing operation.	OEMP. A Design Approach Document (DAD), which will include design principles, will be developed and included within the application for development consent.
	• Gales and high winds; and • Storms.	• The design of the Proposed Scheme will be in accordance with the UK Building Regulations and BE EN codes. These account for increases in wind event frequencies and magnitudes due	Inherent in the design of the Proposed Scheme as described in **Section 2.2** of **Chapter 2: Site and**

Receptor	Climate Variable	Embedded Design, Mitigation and Enhancement Measures	Evidence of Commitment
		to climate change via the various nationally defined parameters. • Structures will be adequately designed to allow for future worst-case wind conditions. • The maintenance procedures will be set out in an OEMP, which will be prepared prior to the Proposed Scheme commencing operation.	**Proposed Scheme Description (Volume 1).**
	• Sea level rise. • Storm surge. • storm tide.	• Finished floor levels, as informed by the FRA, would, where practicable, be set at an appropriate level, including freeboard above the modelled breach flood level of the River Thames. Alternatively, any flood sensitive equipment could be raised above the breach flood level.	An FRA will be prepared as a technical appendix to Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES, with compliance secured by DCO Requirement. Further detail is provided within **Section 11.4** of **Chapter 11: Water Environment and Flood Risk (Volume 1)**.
Proposed Jetty	• Extreme precipitation events (flooding).	• The flood level data includes allowances for climate change, in accordance with Environment Agency requirements, and this data has been taken forward for the purposes of defining design levels for the Proposed Jetty. • In respect of allowances for peak rainfall intensity (used to inform surface water drainage) the Proposed Scheme design has	Outline Drainage Strategy, with pre-construction implementation secured by a DCO Requirement.

Receptor	Climate Variable	Embedded Design, Mitigation and Enhancement Measures	Evidence of Commitment
		been based upon a 40% uplift in rainfall intensity, as required by LBB.	
	• Extreme temperature events.	• The design will be in accordance with the UK Building Regulations and BE EN codes. Where no BS EN code exists the Eurocodes and ISO standards will be adopted. Regular civil asset condition surveys will be carried out in line with the condition and deterioration rates observed on Middleton Jetty. Proactive maintenance (details of which will be outlined in the ES) to address any defects is planned in line with Middleton Jetty experience.	A DAD, which will include design principles, will be developed and included within the application for development consent.
	• Gales and high winds. • Storms.	• Consideration of future potential increases in wind loading to be taken into account. Design and construction of Proposed Jetty to be able to withstand increased wind loading.	Further detail is provided within **Section 19.7** and **19.9** of **Chapter 19: Marine Navigation (Volume 1).**
	• Sea level rise. • Storm surge. • Storm tide.	• A periodic maintenance dredge will be required to ensure the Proposed Jetty remains operational at all states of the tide. • Periodic maintenance dredging will be required to ensure the Proposed Jetty remains accessible. The exact volumes and frequency of the maintenance dredging will depend on the final design of the Proposed Jetty. Further	Inherent in the design of the Proposed Scheme as described in **Section 2.6** of **Chapter 2: Site and Proposed Scheme Description (Volume 1).** See **Section 19.7** of **Chapter 19: Marine Navigation (Volume 1).** Navigation measures will be documented in the Preliminary

Receptor	Climate Variable	Embedded Design, Mitigation and Enhancement Measures	Evidence of Commitment
		detail on the maintenance dredging required will be assessed in the ES. • Operational limits of uncontrollable factors to ensure safe and efficient travel, berthing, and loading operations, above which such operation will cease until levels are back within acceptable tolerances will be determined. Such limits will include wind speed and direction, height of tide, tidal stream, and visibility.	Navigation Risk Assessment (pNRA) which will be included as a technical appendix to the ES.
Ancillary Infrastructure	• Change in annual average precipitation. • Extreme precipitation events. • Drought.	• Finished floor levels would, where practicable, be set at an appropriate level, including freeboard above the modelled breach flood level of the River Thames. Alternatively, any flood sensitive equipment could be raised above the breach flood level. • The evolving drainage design will be designed such that the rate of surface water run-off leaving the Site and entering the adjacent watercourse network is limited to the 1 in 100-year greenfield rate of 35.3 l/s. • Surface water storage will be provided by a below ground tanked system with capacity to cater for a 1 in 100 year plus climate change (+40% increase in rainfall intensity) event.	Outline Drainage Strategy, with pre-construction implementation secured by DCO Requirement. The Outline Drainage Strategy will be included within the application for development consent and contain relevant information on the existing drainage regime and the new drainage regime designed as part of the Proposed Scheme, including any proposed works to ditches. A DAD will be developed and included within the application for development consent. Parameters of environmental assessment (included in **Section**

Receptor	Climate Variable	Embedded Design, Mitigation and Enhancement Measures	Evidence of Commitment
		• The flood level data includes allowances for climate change, in accordance with Environment Agency requirements, and this data has been taken forward for the purposes of defining design levels. • In respect of allowances for peak rainfall intensity (used to inform design of surface water management infrastructure), scheme design has been based upon a 40% uplift in rainfall intensity, as required by LBB. • Breach flood levels in the northwestern area of the Site may exceed 2.97m AOD, such that there is the potential for floodwater to enter the building. It is therefore recommended that flood sensitive equipment is set a minimum of 400 mm above the recommended FFL in these areas. • Implementation of SuDS, i.e., interceptors and silt traps which will be emptied regularly to ensure flows of water, to avoid flooding. • All operational areas and access road will be covered with hardstanding to prevent any mobilisation of pollutants. • The design, installation, commissioning, operation and maintenance of plant, drainage	**2.3** of **Chapter 2: Site and Proposed Scheme Description (Volume 1)**), together with limits of deviation (which will be included in the draft DCO or documents referred to by it). An FRA will be prepared as a technical appendix to Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES, with compliance secured by DCO Requirement.

Receptor	Climate Variable	Embedded Design, Mitigation and Enhancement Measures	Evidence of Commitment
		systems, equipment and machinery, including associated systems, will take into account Good Engineering Practice.	
	• Change in annual average temperature. • Extreme temperature events.	• Any new lighting for the Proposed Scheme will comply with the relevant design standards and therefore suitable to withstand temperature changes sufficient for their operational life span. An Outline Lighting Strategy will be prepared for the Proposed Scheme. The approach lighting for the Proposed Scheme will be determined as part of the ongoing design development (with appropriate controls for the protection of human and ecological receptors) and assessed accordingly in the ES.	Outline Lighting Strategy, with pre-construction implementation secured by DCO Requirement. Inherent in the design of the Proposed Scheme as described in **Section 2.6** of **Chapter 2: Site and Proposed Scheme Description (Volume 1).**
	• Gales and high winds. • Storms.	• To be confirmed and assessed within the ES.	To be confirmed and assessed within the ES.
	• Sea level rise. • Storm surge. • Storm tide.	• Finished floor levels would, where practicable, be set at an appropriate level, including freeboard above the modelled breach flood level of the River Thames. Alternatively, any flood sensitive equipment could be raised above the breach flood level.	Compliance with secured by DCO requirement. Further detail is provided within **Section 11.4** of **Chapter 11: Water Environment and Flood Risk (Volume 1)**.

Receptor	Climate Variable	Embedded Design, Mitigation and Enhancement Measures	Evidence of Commitment
Environmental Mitigation Area	• Changes in annual average precipitation. • Extreme Precipitation events (flooding).	• The maintenance procedures will be set out in an OEMP, which will be prepared prior to the Proposed Scheme commencing operation. Procedures for the maintenance of the Mitigation Area will be set out in an Outline Landscape and Environmental Management Plan (OLEMP) (or similar type document as the Applicant is continuing to develop its thinking on these areas) will be submitted with the application for development consent. • Adherence to Best Practice Guidance and British Standards.	Planting proposals will be outlined in the OLEMP and the DAD to be submitted with the application for development consent. Further detail is provided in **Section 7.9** of **Chapter 7: Terrestrial biodiversity (Volume 1).**
	• Extreme temperature events.		
	• Sea level rise. • Storm surge. • Storm tide.		
End users (operational staff)	• Extreme precipitation events (flooding).	• Should the area in the vicinity of the Site be inundated following a breach of the tidal flood defences, such that safe exit is not possible, safe refuge may be provided for operational staff/visitors within the administration block and other areas of the building which will be located above the 0.5% (1 in 200 year) AEP breach flood level.	An FRA will be prepared as a technical appendix to Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES, with compliance secured by DCO Requirement. An Outline Emergency Preparedness and Response Plan (EPRP) will be developed and included within the application for development consent.
	• Extreme temperature events.	• To be confirmed and assessed within the ES.	

Receptor	Climate Variable	Embedded Design, Mitigation and Enhancement Measures	Evidence of Commitment
	• Gales and high winds; and • Storms.	• The design will be in accordance with the UK Building Regulations and BE EN codes. These account for increases in wind event frequencies and magnitudes due to climate change via the various nationally defined parameters. • Structures will be adequately designed to allow for future worst-case wind conditions.	A DAD which will include design principles, will be developed and included within the application for development consent. An Outline EPRP will be developed and included within the application for development consent.
	• Sea level rise; • Storm surge; and • Storm tide.	• Should the area in the vicinity of the Site be inundated following a breach of the tidal flood defences, such that safe exit is not possible, safe refuge may be provided for operational staff/visitors within the administration block and other areas of the building which will be located above the 0.5% (1 in 200 year) AEP breach flood level.	An FRA will be prepared as a technical appendix to Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES, with compliance secured by DCO Requirement. An Outline EPRP will be developed and included within the application for development consent.

12.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

12.8.1. **Table 12-9** and **Table 12-10** presents the preliminary assessment of impacts and effects for the Proposed Scheme during both the construction and operation phases, with the consequence assessment considering the embedded design, mitigation and enhancement measures detailed in **Section 12.7**.

12.8.2. The choice between demolition or retention of the Belvedere Power Station Jetty (disused) will not change the outcomes of the preliminary assessment of impacts and effects reported within this technical chapter. If the structure is demolished, this will occur during the construction phase and be managed as part of the OCoCP. Therefore, the structure is unlikely to be impacted by climate change. If the structure is retained, it will not be an operational asset.

12.8.3. The construction assessment presented in this chapter is appropriate for both construction programme options, as set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1**), although this will be assessed and confirmed in the ES.

CONSTRUCTION PHASE

Table 12-9: Climate Resilience Assessment of Significance of Effects (Construction Phase)

Receptor	Climate Variable	Potential Impacts	Likelihood	Consequence	Significance
• **Construction site (including Temporary Construction Compounds).** • **Construction staff.** • **Construction materials.** • **Construction Plant and equipment**.	• Sea level rise. • Storm surge. • Storm tide.	Flooding of excavations.	To be confirmed and assessed within the ES.		
		Reducing earthwork stability and hastening the deterioration of materials.			
		Damage to construction equipment and materials through flooding / overtopping of defences.			
		Existing drainage infrastructure overwhelmed.			
		Mobilisation of pollutants, affecting building materials.			
		Access routes may be impeded by flooding.			
		Construction programme delays.			
		Injuries to workforce and H&S risks.			

OPERATION PHASE

Table 12-10: Climate Resilience Assessment of Significance of Effects (Operation Phase)

Receptor	Climate Variable	Potential Impacts	Likelihood	Consequence	Significance
Carbon Capture Facility	Extreme precipitation events (flooding).	Flooding of assets resulting in loss or disruption of function and associated risks.	High	Minor	Not Significant
		Deterioration of material structure and fabric.	High	Minor	Not Significant
		Drainage infrastructure overwhelmed leading to surface water flooding.	High	Minor	Not Significant
		Mobilisation of pollutants, affecting building materials.	High	Negligible	Not Significant
	Extreme temperature events.	Changes in water temperature and availability of water for cooling may affect operation.	High	Negligible	Not Significant
		Greater demand for cooling.	High	Negligible	Not Significant
		Risk of fire and associated safety risks.	Medium	Minor	Significant

Receptor	Climate Variable	Potential Impacts	Likelihood	Consequence	Significance
		Faster rate of deterioration of materials from increase in UV radiation e.g., fading and brittleness.	To be confirmed and assessed within the ES.		
		Expansion of building joints compromising structural integrity leading to increase maintenance.	Medium	Minor	Not Significant
	• Gales and high winds. • Storms.	Increase in wind loading on the stacks.	High	Minor	Not Significant
		Damage from high winds and rain infiltration into surfaces and materials.	To be confirmed and assessed within the ES.		
		Increased maintenance requirements.	High	Minor	Not Significant
		Potential for safety risks should structure become weakened.	High	Minor	Not Significant
		Soil erosion leading to destabilisation.	To be confirmed and assessed within the ES.		

Receptor	Climate Variable	Potential Impacts	Likelihood	Consequence	Significance
		Lightning strikes leading to power outages onsite and causing fires.	To be confirmed and assessed within the ES.		
	• Sea level rise. • Storm surge. • Storm tide.	Damage to infrastructure.	To be confirmed and assessed within the ES.		
		Reducing earthwork stability and hastening the deterioration of materials.			
		Power outages and threats to business continuity.			
		Damage to Infrastructure.			
Proposed Jetty	Extreme precipitation events (flooding).	Flooding resulting in loss or disruption of function and associated risks.	High	Minor	Not Significant
		Deterioration of material structure and fabric.	High	Minor	Not Significant
		Destabilisation or impact on the structure of Proposed Jetty.	High	Minor	Not Significant
	Extreme temperature events.	Faster rate of deterioration of materials from increase in UV radiation e.g., fading and brittleness.	To be confirmed and assessed within the ES.		

Receptor	Climate Variable	Potential Impacts	Likelihood	Consequence	Significance
		Increase in thermal expansion of structure joints compromising structural integrity leading to increased maintenance.			
	• Gales and high winds. • Storms.	Increased maintenance requirements.	High	Minor	Not Significant
		Destabilisation of structure due to lightning strike.	To be confirmed and assessed within the ES.		
		High winds may damage the Proposed Jetty.	Medium	Minor	Not Significant
	• Sea level rise. • Storm surge. • Storm tide.	Reducing earthwork stability and hastening the deterioration of materials.	To be confirmed and assessed within the ES.		
Ancillary Infrastructure	• Change in annual average precipitation. • Extreme precipitation events.	Increased surface runoff leading to surface water flooding and siltation.	High	Minor	Not Significant
		Drainage infrastructure overwhelmed leading to surface water flooding.	High	Negligible	Not Significant

Receptor	Climate Variable	Potential Impacts	Likelihood	Consequence	Significance
	• Drought.	Mobilisation of pollutants, affecting Ancillary Infrastructure.	High	Negligible	Not Significant
		Flooding of assets resulting in loss or disruption of function and associated risks;	High	Negligible	Not Significant
		Deterioration of material structure and fabric.	High	Negligible	Not Significant
		Windborne dust and debris clogging drainage channels and requiring clearing.	To be confirmed and assessed within the ES.		
		Flooding of the road.	High	Minor	Not Significant
		Water ingress may damage electrical equipment leading to power loss.	High	Minor	Not Significant
		Damage of machinery.	High	Minor	Not Significant
		Melting or deterioration of road surfaces.	To be confirmed and assessed within the ES.		

Receptor	Climate Variable	Potential Impacts	Likelihood	Consequence	Significance
	• Change in annual average temperature. • Extreme temperature events.	Failure of security infrastructure and lighting due to overheating.	To be confirmed and assessed within the ES.		
		Reduction in the ability of the ground to conduct heat away from underground cables during high temperatures.	To be confirmed and assessed within the ES.		
		Overheating of any existing power generation units and stack associated with safety risks.	To be confirmed and assessed within the ES.		
		Faster rate of deterioration of materials from increase in UV radiation, e.g., fading and brittleness.	To be confirmed and assessed within the ES.		
		Overheating of electrical equipment increasing the risk of fire.	To be confirmed and assessed within the ES.		
		Expansion of materials resulting in damage or increased fatigue, structural integrity loss and increased maintenance.	To be confirmed and assessed within the ES.		

Receptor	Climate Variable	Potential Impacts	Likelihood	Consequence	Significance
	• Gales and high winds. • Storms.	Increased maintenance requirements.	To be confirmed and assessed within the ES.		
		Destabilisation of structures due to lighting strike.			
		Power loss.			
		Windborne dust and debris clogging drainage channels and requiring clearing.			
		Damage from high winds and rain infiltration into surfaces and materials. Damage to signage.			
	• Sea level rise. • Storm surge. • Storm tide.	Damage to infrastructure.	To be confirmed and assessed within the ES.		
		Reducing earthwork stability and hastening the deterioration of materials.			
		Power outages and threats to business continuity.			
		Reducing earthwork stability and hastening the deterioration of materials.			

Receptor	Climate Variable	Potential Impacts	Likelihood	Consequence	Significance
		Power outages and threats to business continuity.			
Mitigation Area	• Changes in annual average precipitation. • Extreme Precipitation events (flooding).	Longer growing season, more vigorous vegetation growth within the Mitigation Area in spring and autumn without a vegetation management plan.	To be confirmed and assessed within the ES.		
		Flooding of the Mitigation Area.			
	• Extreme temperature events.	Shrinking and cracking of soils.	To be confirmed and assessed within the ES.		
		Increased dieback of vegetation/planting within the Mitigation Area.			
	• Sea Level Rise. • Storm surge. • Storm tide.	Flooding of the Mitigation Area.	To be confirmed and assessed within the ES.		

Receptor	Climate Variable	Potential Impacts	Likelihood	Consequence	Significance
End users (operational staff)	• Extreme precipitation events (flooding).	Access routes may be impeded by flooding.	High	Minor	Not Significant
		Damp buildings can lead to mould growth resulting in health issues.	To be confirmed and assessed within the ES.		
		Injuries to workforce.	Low	Moderate	Not Significant
	• Extreme temperature events.	High temperatures can cause discomfort, alongside impacting concentration and productivity of staff.	To be confirmed and assessed within the ES.		
		Injuries to workforce.			
	• Gales and high winds. • Storms.	Access routes for end users may be impeded by storm debris.	To be confirmed and assessed within the ES.		
	• Sea level rise. • Storm surge. • Storm tide.	H&S risks due to disruption of services.	To be confirmed and assessed within the ES.		

12.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

12.9.1. This section sets out the likely additional mitigation and compensation measures which are relevant for climate resilience. This section will be reviewed and updated in the ES as details of embedded mitigation are confirmed.

CONSTRUCTION PHASE

12.9.2. Subject to confirmation of the embedded mitigation (to be presented in the ES) and to incorporate ongoing design development, the following list presents potential measures that will be included, as appropriate, within the OCoCP to be submitted with the application for development consent:

- Construction drainage (i.e., for surface water runoff) will have sufficient capacity to cope with heavy rainfall events.
- Silt traps are in use and regularly emptied to ensure flows of water, to avoid flooding.
- Spoil heaps and stockpiles will, where appropriate, be sealed shortly after excavation and formation to preserve their profile and integrity of stability.
- Spoil and material heaps will, where appropriate, be covered in advance of predicted storms that are likely to include periods of high rainfall and/or high winds.
- Minimise the material stockpiled by either using it as soon as possible or removing from site if reuse or redeployment is not a viable option. Where material is stockpiled onsite, this would be regularly inspected in advance, during, and following, extreme weather events (e.g., storms and heatwaves).
- Provide adequate rest, shade, sun protection (such as hats and sun cream), and drinking water, for construction staff during periods of high temperature and high solar radiation.
- Ensure welfare facilities have adequate shading and are cooled against excessive heat.
- Adjust the programme of work activities or scheduling daily working time to account for extreme weather conditions such as high winds, heavy precipitation and high temperatures, building contingency into the programme.
- Switch-off machinery when not in use to avoid the risk of overheating.

12.9.3. Subject to the confirmation of embedded mitigation measures, which will be confirmed and presented in the ES, the following measures may be required in the design of the Proposed Scheme:

- Regard to projections of extreme temperature when specifying materials. For example, use harder binders in asphalt, and alter the concrete mix. Re-consider choice of materials when repair or replacement is necessary as part of planned maintenance processes.
- Ensure structures have been designed to accommodate an increase in extreme wind and storm events, including ensuring emergency access routes to critical parts of the infrastructure, even in the event of flooding.
- Incorporating planting resilient to the projected changes in climate in the evolving design.
- If practicable, collect and store rainwater to support the supply of water (from mains) used for other supporting functions (e.g., washing/cleaning of machinery; irrigation for any planted areas).
- Ensure the management protocols of the Contractor, including overall management and any civil works contractors employed, are proactive in response to the forecasting of extreme weather events.

OPERATION PHASE

12.9.4. The follow list presents potential operational measures:

- Adherence to environmental permits to facilitate the use of cooling water abstracted from the River Thames.
- Lighting protection to be installed on all sites in case of storm event, the detail regarding this will be included in the Outline Lighting Strategy to be submitted with the application for development consent.
- Coatings/cladding provided to minimise corrosion / deterioration on plant and buildings in case of wind and storm events, to be included in the Register of Commitments to be submitted with the application for development consent.
- Inspection of earthworks and structures following extreme weather events (e.g., floods, heatwaves, drought, storm). Bring forward repair/replacement if necessary. To be included in the Register of Commitments to be submitted with the application for development consent.
- Ensure the OEPRP, to be submitted with the application for development consent, incorporates responses to extreme weather events.
- Ensure the OEPRP, to be submitted with the application for development consent, incorporates processes to safely shut down the facility in case of prolonged period of drought as this can affect structural stability and lead to cracking of surfaces.
- Ensure the OEPRP includes measures to manage extreme weather events and consequences such as risk of fire from overheating and flooding etc.

- In conjunction with the Environment Agency, ensure the River Wall is routinely inspected to understand the condition of the defences and any upgrades/repairs that may be necessary. This will be included in the Register of Commitments to be submitted with the application for development consent. A condition survey report was carried out over 2021 and 2022 and found that multiple sections were assessed as 'fair' condition in need of remedial works (which have been progressed).

12.10. MONITORING

12.10.1. The Applicant will monitor the effects of extreme weather-related incidents (for example, road surface deformations, flooding, snow and ice etc.) to assist in identifying thresholds which, when exceeded, require maintenance. Inspections will be carried out following an intense rainfall event or heatwave to monitor any damage and implement appropriate mitigation as necessary.

12.10.2. Given the uncertainties inherent in climate science and projections, the impacts and effects identified will be monitored throughout the construction and operation phases of the Proposed Scheme. This would include monitoring of local extreme weather events via the Met Office, regular (potentially annual) reviews of the State of the UK Climate Report (Met Office) to review and understand any changes in climate trends. The monitoring would be undertaken to assess the appropriateness of the mitigation measures.

12.10.3. Any additional monitoring requirements will be considered and reported as part of the ES.

12.11. RESIDUAL EFFECTS

12.11.1. The assessment of residual effects will be presented in the ES, following the complete assessment of embedded mitigation and significance. It is anticipated that with the additional design, mitigation and enhancement measures in place that all effects will be considered **Not Significant**.

12.12. NEXT STEPS

12.12.1. Embedded design, mitigation and enhancement measures will be confirmed and used to inform the assessment of potential significant effects which will be presented in the ES. In the event of any potential significant effects being identified, further additional mitigation and enhancement measures will be identified to reduce any outstanding potential significant effects.

12.13. LIMITATIONS AND ASSUMPTIONS

12.13.1. This section outlines the limitations, uncertainties, and assumptions made in undertaking climate resilience assessment reported in this chapter.

- There is currently no agreed industry methodology that should be applied for assessing climate resilience for EIA developments. Therefore, an approach has been developed and applied in this assessment based on existing best practice and professional experience.
- The UKCP18 projections have been used to infer future changes in a range of climate variables that may affect the vulnerability of the Proposed Scheme to climate change. At the time of writing, these represent the most up-to-date representation of future climate in the UK.
- The UK Climate Resilience Programme Climate Risk Indicators[42], developed as part of the have been used to infer this assessment. As such there are inherited limitations and uncertainties within the data. Further information on the methodology used to produce this data can be found in 'Changing Climate Risk in the UK: a Multi-sectoral Analysis using Policy-relevant Indicators'[43]. The Climate Risk Indicators utilise UKCP18 projections. At the time of writing, these represent the most up-to-date representation of future climate in the UK.
- There are inherent uncertainties associated with climate projections and they are not predictions of the future. It is possible that future climate will differ from the future baseline climate against which the resilience of the Proposed Scheme has been assessed, depending on global emissions over the next century. A 'high' emissions scenario (RCP8.5) using the 2080s time slice (2070–2099, the longest temporal scale available through UKCP18) has been used to develop the baseline against which vulnerability has been assessed. This is consistent with the precautionary principle (i.e. 'worst-case' scenario).
- Any further research, analysis or decision-making should take account of the accuracies and uncertainties associated with climate projections. It is also important to note that the analysis is based on selected observational data, the results of climate model ensembles and a selected range of existing climate change research and literature available at the time of assessment. Any future decision-making based on this analysis should consider the range of literature, evidence and research available at that time and any changes to this.
- The embedded mitigation provided by the design engineers and technical topic specialists is based on the preliminary design of the Proposed Scheme and may alter as the design progresses.

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DECARBONISATION

CHAPTER 13: GREENHOUSE GASES

Cory Decarbonisation Project

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FIGURE (MAIN TEXT ONLY)

TABLE

13. GREENHOUSE GASES

13.1. INTRODUCTION

13.1.1. This chapter reports the preliminary assessment of the likely significant effects of the Proposed Scheme on greenhouse gases (GHG) during construction and operation and describes:

- relevant policy, legislation and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operational phase.

13.2. POLICY, LEGISLATION, AND GUIDANCE

13.2.1. The policy, legislation, and guidance relevant to the assessment of GHG for the Proposed Scheme is detailed in **Table 13-1**.

Table 13-1: GHG Summary of Key Policy, Legislation and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011[1]	Sets out the Government's policy for delivery of major energy infrastructure and is currently the primary basis for decision making of applications within the Planning Act 2008 regime. Section 2 (Government policy on energy and energy infrastructure development) specifies the need for the UK to decarbonise its energy mix with Section 3 (The need for new nationally significant energy infrastructure projects) outlining how the Government would like industry to bring forward low carbon developments such as Carbon Capture and Storage (CCS) to meet the challenge of energy security and the UK's 2050 targets.
Draft Overarching National Policy Statement (NPS) for Energy EN-1 2023[2]	This Draft Overarching National Policy Statement for Energy (EN-1) is part of a suite of draft NPSs issued by the Secretary of State of DESNZ. It sets out the government's policy for delivery of major energy infrastructure and will likely replace the 2011 NPSs by the time the application for the Proposed Scheme is submitted. This document expands on the existing NPS EN-1 Section 3 by having a specific section (3.5) on "*The need for new nationally significant carbon capture and storage*

Policy, Legislation or Guidance	Description
	infrastructure". Paragraphs 3.5.1-3.5.7 set out the need for CCS infrastructure over the coming decades. Section 5.3 sets out how Applicants should carry out their assessments and the factors that the Secretary of State should take into account in decision making. It also requires the Applicant to produce a GHG Reduction Strategy, which will be prepared to accompany the ES.
National Planning Policy Framework (NPPF) 2023[3]	The NPPF sets out the Government's planning policies for England and how these should be applied, with the following paragraphs relating to GHG: Section 11, Paragraph 120 of the NPPF notes that planning policies and decision should "*recognise that some undeveloped land can perform many functions, such as…carbon storage or food production*". Section 14, Paragraph 152 of the NPPF provides that *"The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure*". Paragraph 154 provides that "*New development should be planned for in ways that: … b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design*". Paragraph 158 provides that "*When determining planning applications for renewable and low carbon development, local planning authorities should: a) not require applicants to demonstrate the overall need for renewable or low carbon energy…; and b) approve the application if its impacts are (or can be made) acceptable*". Whilst paragraph 5 of the NPPF confirms the framework does not contain specific policies for nationally significant infrastructure projects, it is identified that the policies contained in the NPPF may include other matters that are relevant. Accordingly, the Secretary of State may determine that the policies of the NPPF in relation to climate change, in addition to those contained in local

Policy, Legislation or Guidance	Description
	planning policy, discussed below, are relevant to their determination of the application for development consent for the Proposed Scheme.
The London Plan 2021[4]	The Spatial Development Strategy for Greater London setting out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policy SI2 of the London Plan is the key policy relevant to GHG emissions: "*Major development should be net zero-carbon. This means reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy:* *1) be lean: use less energy and manage demand during operation* *2) be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly* *3) be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site* *4) be seen: monitor, verify and report on energy performance".* Paragraph 9.2.11 states: "*Operational carbon emissions will make up a declining proportion of a development's whole life-cycle carbon emissions as operational carbon targets become more stringent. To fully capture a development's carbon impact, a whole life-cycle approach is needed to capture its unregulated emissions (i.e., those associated with cooking and small appliances), its embodied emissions (i.e. those associated with raw material extraction, manufacture and transport of building materials and construction) and emissions associated with maintenance, repair and replacement as well as dismantling, demolition and eventual material disposal)".*
The Bexley Local Plan 2023[5]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development across the Borough, including measures to adapt to and mitigate the effects of climate change. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy.

Policy, Legislation or Guidance	Description
	Policy SP14: Mitigating and Adapting to Climate Change, states that the council *"will actively pursue the delivery of sustainable development by:* • *Supporting developments that achieve zero-carbon and demonstrate a commitment to drive down greenhouse gas emissions to net zero;* • *Supporting new and enhanced green infrastructure, including greening of development sites such as living roofs, and the contribution green infrastructure can make to managing flood risk and surface water, and to the mitigation of the urban heat island effect".* The non-strategic development management policy for climate mitigation is Policy DP30, which states: *"Major development proposals must meet London Plan requirements and calculate whole life-cycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions".*
The Bexley Climate Change Statement and Action Plan 2022 to 2026[6]	This action plan works alongside Bexley's existing plans and strategies, setting out the climate priorities and ambitions for the years ahead. Part 2 of the action plan focuses on the actions that would "*Influence others to reduce emissions that are not within our direct control*". Under Commitment 5 – Empower our residents, businesses and partners to make positive changes, it is committed to "*Work with Cory Riverside Energy to encourage the use of the heat produced at the Belvedere Riverside Resource Recovery Ltd in a local district heating initiative or by a local business*."
London Environment Strategy 2018[7]	The London Environment Strategy seeks to ensure that London will become a "*zero carbon city by 2050*" by setting out policies and proposals in seven policy areas to address environmental challenges, including the transition to a low carbon circular economy. The Mayor wants to ensure "*London's businesses and workers are supported to be able to compete effectively in, and benefit from, this growing global market*". The Strategy also outlines the carbon budgets for London from 2018 to 2032, which represents an ambitious pathway to put London on track to achieving zero emissions by 2050.

Policy, Legislation or Guidance	Description
Powering up Britain 2023[8]	In 2021, the UK Government published the Build Back Greener Net Zero Strategy[9] which set out the UK's plans for meeting net zero emissions by 2050, and the carbon budgets. The strategy was ruled unlawful by the High Court in July 2021, because it was deemed not to meet the legal obligations under the Climate Change Act, as there was not enough detail provided on how the target would be met. 'Powering up Britain' was published in 2023, providing more detail on how carbon budgets will be achieved on a policy-by-policy basis, and presenting the Government's intentions to enhance the country's energy security and deliver the UK's net zero commitments. Powering Up Britain includes: • Net Zero Growth Plan[10] • Energy Security Plan[11] • Government's response to the Independent Review of Net Zero (the Skidmore Review)[12] • Government's response to the Climate Change Committee's 2022 progress report[13] • Carbon Budget Delivery Plan[14] Powering up Britain 2023[8] includes an ambition to deliver four carbon capture, usage and storage (CCUS) clusters, capturing 20-30 $MtCO_2$/year across the economy, including 6 $MtCO_2$/year of industrial emissions, per year by 2030.
Intergovernmental Panel on Climate Change (IPCC) Special Report – Global Warming of 1.5 ºC 2018[15]	The IPCC has confirmed the need for global carbon emissions to follow a pathway that will prevent global warming exceeding 1.5 ºC. In its global emission pathways, the IPCC outlines the role of carbon capture and storage and how it can contribute to negative emissions, driving reductions in the energy sector. The IPCC's Synthesis Report for the Sixth Assessment (Summary for Policymakers) Report states that: *"All global modelled pathways that limit warming to 1.5°C with no or limited overshoot, and those that limit warming to 2°C involve rapid and deep and, in most cases, immediate greenhouse gas emissions reductions in all sectors this decade"*. The report further highlights the need for carbon dioxide removal to stay within the bounds of 1.5°C warming trajectory.

<table>
<tr><th>Policy, Legislation or Guidance</th><th>Description</th></tr>
<tr><td>Climate Change Committee (CCC): The Sixth Carbon Budget The UK's path to Net Zero 2020[16]</td><td>As part of the CCC's recommendation for the UK's Sixth Carbon Budget (which will run from 2033 to 2037), CCS is highlighted as a key mechanism to achieve the 'Balanced Pathway' to Net Zero for the UK.
In particular, the report states that while natural removals of carbon dioxide are vitally important in achieving Net Zero, the CCC assessment shows that it is unlikely that Net Zero could be achieved cost-effectively without a significant contribution from 'engineered' removals of carbon dioxide, for example through the use of CCS.</td></tr>
<tr><td>Carbon Budget Delivery Plan[17] and Carbon Budget 6</td><td>The Carbon Budget Delivery Plan details how the UK Government intend to meet Carbon Budgets 4 to 6 (to 2037), though proposals and policies, and their anticipated emissions reductions (where quantified) to 2037.
The Plan also details the expected performance against the Carbon Budgets and shows that for CB6 (965 $MtCO_2e$) there is expected to be an overshoot of 32 $MtCO_2e$ currently.
Sector relevant residual emissions for each carbon budget are presented in the Plan, as summarised below:
<table>
<tr><th>Sector</th><th>Carbon Budget 4 (CB4) 5-yr (average pa)</th><th>CB5 5-yr (average pa)</th><th>CB6 5-yr (average pa)</th></tr>
<tr><td>Power</td><td>143 (29)</td><td>63 (13)</td><td>42 (8)</td></tr>
<tr><td>Greenhouse Gas Removals</td><td>0 (0)</td><td>-32 (-6)</td><td>-117 (-23)</td></tr>
</table></td></tr>
<tr><td>The Clean Growth Strategy 2017[18]</td><td>One of the key policies under the UK's Clean Growth Strategy is 'Improving Business and Industry Efficiency' of which a key area is to deploy CCS at scale in the UK.
This has been further supported by the UK Policy Paper: Carbon capture, usage and storage net zero investment roadmap[19]. This strategy outlines the joint government and industry commitments to the deployment of CCUS in the UK and sets out the approach to delivering 4 CCUS low carbon industrial clusters, capturing 20-30 MtCO2 per year across the economy by 2030 to help meet the UK's 2050 net zero target.</td></tr>
</table>

Policy, Legislation or Guidance	Description
South East Inshore Marine Plan 2021[20]	The South East Inshore Marine Plan area stretches from Felixstowe in Suffolk to west of Dover in Kent and incorporates the River Thames. It will help to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan area. Policy SE-AIR-1 states that "*Proposals must assess their direct and indirect impacts upon local air quality and emissions of greenhouse gases."* In addition, Policy SE-AIR-1 advises that "*Proposals that are likely to result in increased air pollution or increased emissions of greenhouse gases must demonstrate that they will, in order of preference:* *a) avoid* *b) minimise* *c) mitigate* *air pollution and/or greenhouse gas emissions in line with current national and local air quality objectives and legal requirements."*
Legislation	
United Nations Framework Convention on Climate Change 1992[21]	The UK is a member of the United Nations Framework Convention on Climate Change (UNFCCC) which drives international action on climate change. The UK has pledged to reduce Emissions under the 'Paris Agreement' in 2015, as a part of a joint pledge by members of the EU. This provides an overarching commitment by the UK.
The Climate Change Act 2008[22]	The Climate Change Act established a legal requirement for an 80% reduction in the GHG Emissions of the UK economy by 2050, in comparison to the 1990 baseline. In addition, in 2019 the UK Government updated this commitment to net zero emissions by 2050 through the Climate Change Act 2008 (2050 Target Amendment) Order 2019. The Climate Change Act also created the Committee on Climate Change, with responsibility for setting 5-year carbon budgets covering successive periods of Emissions reduction to 2050.
Infrastructure Carbon Review 2013[23]	In 2013, the UK government published the Infrastructure Carbon Review aiming to *"release the value of lower carbon solutions and to make carbon reduction part of the*

Policy, Legislation or Guidance	Description
	DNA of infrastructure in the UK". Major infrastructure owners, operators and developers across the communication, energy, transport, waste and water sectors were invited to endorse it, become signatories to, and make commitments under the Review. The Review provided increased emphasis on 'capital carbon' (GHG emissions associated with raw materials, activities and transport for construction, repairs, replacement, refurbishment and de-construction of infrastructure) while acknowledging that 'operational carbon' (associated with energy consumption for the operation and use of infrastructure) will continue to dominate overall emission to 2050 and beyond. The Infrastructure Carbon Review highlighted the importance of assessing GHG Emissions early in the lifecycle of an infrastructure scheme when there is the greatest carbon reduction potential. The assessment presented in this chapter provides an assessment of the Proposed Scheme early in its lifecycle. The Review also led to the publication of a Publicly Available Specification (PAS) on infrastructure carbon management; PAS2080:2016 (revised in 2023)[25].
Guidance	
National Planning Practice Guidance 2021[24]	Explains the processes and tools that can be used through the planning system in England. The guidance highlights the importance of and advises how to identify suitable climate change mitigation and adaptation measures in the planning process. This would require the implementation of appropriate measures by the local planning authorities.
PAS 2080:2023[25]	PAS 2080:2023 is a standard for managing carbon in building and infrastructure. It looks at the whole value chain and aims to reduce carbon and cost through intelligent design, construction and use.
GHG Protocol[26]	The GHG Protocol establishes comprehensive global standardised frameworks to measure and manage GHG emissions from private and public sector operations, value chains and mitigation actions.
IFC Environmental, Health, and Safety	The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and

Policy, Legislation or Guidance	Description
Guidelines for Thermal Power Plants 2017[27]	industry-specific examples of Good International Industry Practice (GIIP). The GIIP can be applied to similar infrastructure including carbon capture and storage.
IPCC Guidelines for National Greenhouse Gas Inventories 2006[28]	The 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories was adopted and accepted during the 49th Session of the IPCC in 2019. It was prepared by the Task Force on National Greenhouse Gas Inventories (TFI) in accordance with the decision taken at the 44th Session of IPCC in Bangkok, Thailand, in 2016.
IEMA Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance 2022[29]	The requirement to consider this topic has resulted from the 2014 amendment to the EIA Directive. The aim of this Guidance is to assist practitioners with addressing GHG emissions assessment and mitigation in statutory and non-statutory EIA. The guidance sets out how to: • identify the GHG emissions baseline in terms of GHG current and future emissions; • identify key contributing GHG sources and establish the scope and methodology of the assessment; • assess the impact of potential GHG emissions and evaluate their significance; and • consider mitigation in accordance with the hierarchy for managing project related GHG emissions (avoid, reduce, substitute, and compensate).

13.3. SCOPING OPINION AND CONSULTATION

13.3.1. An EIA Scoping Opinion[30] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26th May 2023. The responses from the Planning Inspectorate in relation to GHG and how these requirements will be addressed by the Applicant are set out in **Table 13-2** below.

Table 13-2: Summary of the EIA Scoping Opinion in Relation to GHG

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
3.9.1	Emissions sources during construction arising from: • A5 disposal of waste; and • A5 land use, land use change and forestry.	*"Table 12-3 omits a description of disposal of waste land use, land use change and forestry from category A5 listed in Table 12-5.* *Whilst it is noted that these are proposed to be scoped out, where legislation or guidance is referred to, all relevant sections should be described.* *The Inspectorate also considers that insufficient evidence has been provided to justify the conclusions reached within the Scoping Report, as the composition of waste from the construction works (including waste high in carbon content such as stripped topsoil or green waste and excess excavation arisings or other material), or area of vegetation and carbon sequestration from the Crossness LNR to be removed, is not specified at present. Therefore, the Inspectorate is not in agreement that these matters can be scoped out."*	An assessment of the emissions associated with the disposal of waste (A5) land use, land use change and forestry (A5) has been included within this technical chapter and will be included within the ES.
3.9.2	• B6 operational energy use; and • B8 operational land use, land use change and forestry.	*"Table 12-4 of the Scoping Report is noted to omit a description of use category B6, and land use, land use change and forestry from category B8 which is listed in Table 12-5.* *Whilst it is noted that these are proposed to be scoped out, where legislation or guidance is referred to, all relevant sections should be described.*	An assessment of the emissions associated with operational energy use (B6) and operational land use, land use change and forestry (B8) has been included within this technical chapter and will be included within the ES.

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
		The Inspectorate also considers that insufficient evidence has been provided to justify the conclusions reached within the Scoping Report, as the operational energy use and area of vegetation and carbon sequestration from the Crossness LNR to be removed, is not specified at present. Therefore, the Inspectorate is not in agreement that these can be scoped out."	
3.9.3	Category B9 – End user emissions	*"The assessment of operational category B9 proposes to scope in the transport of liquified carbon dioxide off site (which is not assessed in any other chapters) but scope out the storage and development of storage locations. The ES should clearly define the project scope and any assumptions made (e.g., vessel movements and routes) and ensure that any aspects of the Proposed Development which require assessment are included in each relevant chapter."*	The scope and assumptions made for the Proposed Scheme is described within **Chapter 2: Site and Proposed Scheme Description (Volume 1)** and **Section 13.4** below.
3.9.4	Categories C1, C2, C3 and C4 (Decommissioning)	*"As noted above there is limited and contradictory information provided in relation to decommissioning, and as such the Inspectorate is not in agreement that this can be scoped out of assessment."*	The Applicant has no plans to decommission and remove the Proposed Scheme. However, removal would be likely to require a similar degree of plant, equipment, and disturbance to that predicted during construction and so similar effects would arise (or indeed could be improved given expected developments in technology over time). Given that the Applicant has no plans to decommission the Proposed Scheme,

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
			further consideration of decommissioning is not considered appropriate. In specific relation to GHG, and in the context of the UK achieving net zero by 2050[13], there are uncertainties around deconstruction techniques at the Proposed Scheme's end of life relating to the carbon intensity of fuels used within these deconstruction techniques.
3.9.5	Study Area	*"Paragraph 12.4.1 states "Construction emissions from the Proposed Scheme footprint but also relating to the transport of materials to and from the Site and their manufacture. This may be distant from the Proposed Scheme location, for example, GHG emissions associated with the manufacture of concrete in terms of embodied carbon and energy in the production process". This is also repeated in product stage A1-A3 in Table 12-3."* *"These statements contradict Table 15-10 of the Scoping Report which states that "The impacts of extraction and manufacture of materials cannot be assured with any accuracy and are subject to separate environmental consent and permitting processes, and hence are scoped out of the assessment. Furthermore, neither the construction nor the*	The Study Area for the construction phase assessment is to include emissions within the Site Boundary but also related to the transport of materials to and from the Proposed Scheme and their manufacture (this may be distant from the Proposed Scheme location). Further details on the assessment methodology and the Study Area are provided in **Section 13.5**. The scope of the assessment is defined in **Section 13.4** of this chapter, which includes the benchmarks used within the assessment. The manufacture and transport of raw materials to suppliers (A1-3) has been included in the assessment presented in this

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
		operation of the Proposed Scheme requires direct extraction, processing and manufacture of raw resources". *The ES should be consistent in its approach to the assessment of "upstream" emissions and embodied carbon between chapters, and clearly define what parameters are scoped into and out of the assessment. The ES should also provide details on the scope of the embodied carbon assessment, and where appropriate, indicate benchmarks in the lifecycle of materials used within the Proposed Development.* *In relation to categories A1-A3, whilst noting this is required to be scoped in for the construction phase, the ES should provide clarity on the statement "Furthermore, neither the construction nor the operation of the Proposed Scheme requires direct extraction, processing and manufacture of raw resources" as it is not clear how the Proposed Development could be constructed without the use of raw materials."*	technical chapter and will be included within the ES.

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
3.9.6	Methodology	*"It is not clear within the methodology whether the assessment of greenhouse gas emissions will consider the Proposed Development alone (construction and operation of carbon capture and hydrogen production) or consider the cumulative effects of the potential reduction in greenhouses gases from the operational Riverside 1 and future operational Riverside 2 as a result of the Proposed Development.* *The ES should clearly specify the methodology used for the greenhouse gas assessment including the scope of emissions and how these relate to the statement in paragraph 1.1.5, which states that at least some of the overall Riverside facilities will be carbon negative as a result of the Proposed Development. The ES should demonstrate that the project meets its overall purpose taking into account emissions across the lifecycle."*	The baseline and future baseline conditions take into account the emissions associated with the operation of Riverside 1 and future Riverside 2; further detail is provided in **Section 13.4** of this chapter and this assessment considers the changes in the GHG emissions from the operation of those facilities with the implementation of the Proposed Scheme. As described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer included in the scope of the Proposed Scheme.

13.3.2. No consultation has been undertaken to inform the GHG assessment to date.

13.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

13.4.1. The GHG assessment of the Proposed Scheme has been undertaken in line with the legislation, policy and guidance described in **Section 13.2** of this chapter.

POTENTIAL SIGNIFICANT EFFECTS

13.4.2. Construction and operation phases of the Proposed Scheme are expected to have potential significant effects, each phase has been considered in relation to the PAS 2080:2023[25] lifecycle stages.

13.4.3. As set out in the EIA Scoping Report[25], the following effects are considered to be significant and therefore have been considered further in this assessment.

- Construction:
  - Product stage (manufacture and transport of raw materials to suppliers) (A1-3);
  - Transport of materials to site (A4);
  - Plant and equipment use during construction (A5);
  - Transport of waste (A5);
  - Disposal of waste (A5); and
  - Land use, land use change and forestry (A5).
- Operation:
  - Operation (B1);
  - Maintenance, repair, replacement, refurbishment (B2-5);
  - Operational energy use (B6);
  - Operational water use (B7);
  - Land use, land use change and forestry (B8);
  - Solvent used for the operation of the Carbon Capture Facility (B8); and
  - End-user emissions (B9/D) (Transport).

MATTERS SCOPED OUT

13.4.4. The following effects are considered unlikely to be significant, or no longer arise as part of the Proposed Scheme and therefore have not been considered further in this assessment:

- End-User Emissions (B9/D) (Storage);
- End-user Emissions (B9/D) - The Hydrogen Project (Transport and Use), as described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer included in the scope of the Proposed Scheme Decommissioning Process (C1); and
- Transport and Disposal of End of Life Materials (C2-4).

SENSITIVE RECEPTORS

13.4.5. The impacts of GHG emissions relate to their contribution to global warming and climate change. These impacts are global and cumulative in nature, with every tonne of GHG contributing to impacts on natural and human systems. The receptor is therefore the global atmosphere.

13.4.6. GHG emissions result in the same global effects wherever and whenever they occur. Therefore, the sensitivity of different human and natural receptors is not considered in this preliminary assessment.

13.4.7. A carbon budget is the cumulative amount of carbon dioxide (CO_2) emissions permitted over a period of time to keep within a certain temperature threshold (i.e. the cumulative limit on carbon emissions for those areas in that time period). This assessment has been compared against the UK and London carbon budgets, as set out in section 'Assessment Methodology', to provide context for the estimated emissions (the former being legally binding carbon budgets for the UK, the latter being provided for contextual purposes only).

BASELINE DATA COLLECTION

13.4.8. In the baseline, without the Proposed Scheme, GHG emissions occur constantly and widely as a result of human and natural activity. This includes emissions related to energy consumption (fuel and power), industrial processes, land use and land use change. **Table 13-3** to **Table 13-5** below show the contextual baseline for local and national emissions. The GHG assessment only considers instances in which the Proposed Scheme results in additional or avoided emissions in comparison to the baseline scenario and its assumed evolution. The baseline therefore focuses on those emissions sources subject to change between the baseline and the Proposed Scheme.

13.4.9. The baseline for the Proposed Scheme will include Riverside 1 operating, without Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken). The future baseline will consider both Riverside 1 and Riverside 2 in operation.

ASSESSMENT METHODOLOGY

13.4.10. The assessment approach considers the likely magnitude of GHG emissions (or avoided emissions) in comparison to the baseline, without the Proposed Scheme. It considers emissions throughout the in-scope lifecycle stages and sub-stages (in line with PAS 2080:2023[25]) of the Proposed Scheme. The associated emissions will be calculated through the collection of available data/information on the scale of GHG emitting activities (e.g., tonnes of concrete, litres of fuel, kWh of electricity) and GHG capturing activities for the baseline scenario and for the Proposed Scheme. Where available primary raw data will be used in calculations, where this information is not available proxies or industry benchmarks will be used to estimate emissions. In each case this will cover the Proposed Scheme lifecycle (minimum design life of 50 years, as described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**).

13.4.11. Calculation of the GHG emissions will be made by applying a suitable emissions factor of tonnes of carbon dioxide equivalent (tCO_2e) or tonnes of carbon dioxide (tCO_2) per unit of emissions generating activity. The sources of activity and emissions data, alongside the methodology are outlined below.

13.4.12. The assumptions that have informed the assessment, such as distances for transporting raw materials, are presented in **Section 13.13**.

13.4.13. A summary of calculated emissions results for the baseline and the Proposed Scheme will be summarised in **Section 13.8**.

Construction Phase

13.4.14. The quantification of construction emissions was calculated from a preliminary Bill of Quantities (BoQ), with quantities rounded up to the nearest 10 tonnes. The quantification process covered the following emission sources with reference to PAS 2080:2023[25]:

- Product Stage (manufacture and transport of raw materials to suppliers) (embodied' emissions associated with the 'cradle to gate' of the construction materials) (A1-3);
- Transportation of materials to site (A4);
- Plant use onsite during construction (A5);
- Transportation of construction waste away from site (A5);
- Disposal of waste (A5); and
- Land use, land use change and forestry (A5).

13.4.15. The carbon dioxide quantification has been undertaken using best practice carbon management methods, professional judgement, and guidance including but not limited to the GHG Protocol[26]and PAS 2080:2023[25]. The construction carbon footprint is divided into four main categories: embodied carbon; transport of materials; plant equipment; and transport of construction waste.

13.4.16. The carbon quantification involved reviewing the preliminary BoQ and utilising Inventory of Carbon and Energy (ICE) [31] and other industry recognised carbon reporting tools (such as the National Highways Tool[32]), to use the most accurate densities and emission factors as practicable.

A1-A3 – Product Stage (manufacture and transport of raw materials to suppliers)

13.4.17. Emissions 'embodied' within the construction materials are calculated as follows:

- Quantity of material (t) X emissions factor (tCO_2e/t) = Emissions (tCO_2e).

13.4.18. However, for some construction materials emissions factors are only available on a mass or volume basis. Where only dimensions are available, volumes may need to be calculated; or where mass is required, volumes have been converted to mass using densities.

13.4.19. The quantity of materials for the Proposed Scheme was taken from the preliminary BoQ.

A4 and A5 – Transport of Materials to Site and Transport of Waste

13.4.20. Transportation of construction materials to the Site and waste off the Site are calculated as follows:

- Quantity of material / waste (t) X Distance (km) X emissions factor ($tCO_2e/t.km$) = Emissions (tCO_2e).

13.4.21. However, some construction materials emissions factors are only available on a volume basis. Where only dimensions are available, volumes have been calculated; or where mass is required, volumes have been converted to mass using densities.

A5 - Plant and Equipment Use

13.4.22. Due to the unavailability and uncertainty of plant and equipment usage for construction at the time of writing, an estimate of GHG emissions was calculated using the Royal Institute of Chartered Surveyors[33] assumption. This assumption is based on the estimated construction cost (adjusted for inflation) of the Proposed Scheme:

- Construction cost (£) X RICS Assumption (1400 $kgCO_2e$/£100k of construction cost) (tCO_2/£) = Emissions (tCO_2e)

A5 – Disposal of Waste

13.4.23. Emissions arising from the waste management are calculated as follows:

- Quantity of waste material (t) X Emissions factor (tCO_2e/t) = Emissions (tCO_2e)

A5 – Land use, Land Use Change and Forestry

13.4.24. This is expected to be an assessment that compares the habitats that are subject to change between the baseline and Proposed Scheme scenario.

13.4.25. In order to estimate the carbon storage and the change over time from the different habitats, the habitat type and the hectares of individual habitats will be considered along with appropriate values (tonnes of carbon per hectare (tC per ha)) for carbon storage and flux using best practice taken from the scientific literature available. This is expected to be from the Natural England Carbon Storage and Sequestration by Habitat34 and the Woodland Carbon Code Calculator35.

13.4.26. This data required to complete the assessment is not available at the time of writing and will therefore be presented in the ES based on further information gained as part of the design evolution.

Operation Phase

13.4.27. The quantification of operational emissions covers the following emission sources with reference to PAS 2080:2023[25] lifecycle stages:

- Operation (B1);
- Maintenance, repair, replacement and refurbishment (B2-5);
- Operational energy use (B6);
- Operational water use (B7);
- Land use, Land Use Change and Forestry (B8);
- Solvent used for the Carbon Capture Facility (B8); and
- End-user Emissions (B9/D) (Transport).

B1 – Operation

13.4.28. Operational data has been sourced from the Applicant, with actual annual emissions provided for Riverside 1 and estimated emissions provided for Riverside 2. The Carbon Capture Facility will capture a minimum of 95% of CO_2 emissions from Riverside 1 and 95% of CO_2 emissions from Riverside 2 (once operational) which will be secured via the environmental permit.

13.4.29. Operational refrigerants and waste for the Carbon Capture Facility will be presented in the ES based on further information as part of the design evolution.

B2-B5 – Maintenance (B2), Repair (B3), Replacement (B4) and Refurbishment (B5)

13.4.30. A qualitative assessment has been used to identify the replacement and refurbishment aspects of the Proposed Scheme as quantitative data is not available at the current design stage.

13.4.31. Most elements of the Proposed Scheme have been designed to be maintained rather than repaired, with the need for repair being unforeseen, and as such repair emissions for these elements have been assumed to be zero.

13.4.32. Maintenance dredging of the riverbed is expected to take place to maintain the riverbed at the correct depth to accommodate marine vessels. The required information is expected to be available to inform the ES. Dredging activities (including transportation and waste disposal) will therefore be assessed and presented in the ES.

B6 - Operational Energy Use

13.4.33. The electricity required for the Proposed Scheme is expected to be sourced from Riverside 1 and/or Riverside 2, albeit there may be a limited demand for electricity from the grid at certain times. At the time of writing, further clarity on the electricity demand is required; this will be assessed and presented in the ES.

13.4.34. As described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** back-up power in the form of diesel generators will be available. Emissions resulting from the use of back-up power diesel generators onsite are calculated as follows:

- Amount of diesel fuel (l) X Emissions factor ($kgCO_2e/l$) = Emissions (tCO_2e).

B7 – Operational Water Use

13.4.35. Emissions resulting from the water consumption is calculated as follows:

- Amount of water (l) X Emissions factor ($kgCO_2e$/million litres) = Emissions (tCO_2e).

B8 – Land use, Land Use Change and Forestry

13.4.36. This assessment will be carried out in conjunction with A5 – Land use, Land Use Change and Forestry using the same methodology and data.

13.4.37. The data required to complete the assessment is not available at this stage and will therefore be presented in the ES based on further information gained as part of the design evolution.

B8 – Solvent used for the Operation of the Carbon Capture Facility

13.4.38. Emissions 'embodied' within the solvents are calculated as follows:

- Quantity of solvents (t) X Emissions factor (tCO_2e/t) = Emissions (tCO_2e).

B9/D – End-user Emissions (Transport)

13.4.39. Emissions associated with the transportation of the captured LCO_2 offsite to its end use (temporary storage) is calculated as follows:

- Amount of liquid CO_2 (tonnes) X Distance (km) X Emissions factor ($tCO_2e/t.km$) = Emissions (tCO_2e).

13.4.40. Information on the location of the transported captured LCO_2 is presented in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

SIGNIFICANCE CRITERIA

13.4.41. Any magnitude of emitted or avoided GHG emissions makes a cumulative contribution to climate change (adverse or beneficial respectively).

13.4.42. Significance of GHG impacts is assessed in line with IEMA Guidance[29]; a development's emissions should be based on its net impact over its lifetime, which may be beneficial, adverse or negligible. The evaluation of significance should not just focus on GHG emissions, or the magnitude of those emissions, but whether the Proposed Scheme contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050.

13.4.43. The following terms have been used to define the significance of the effects identified as set out in IEMA Guidance[29]:

- **Major adverse (significant):** the GHG 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 nor make a meaningful contribution to the UK's trajectory towards net zero.
- **Moderate adverse (significant):** the GHG 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, falling short of fully contributing to the UK's trajectory towards net zero.
- **Minor adverse (not significant):** the GHG impacts are fully consistent with applicable existing and emerging policy requirements and good practice design standards; they are fully in line with measures necessary to achieve the UK's trajectory towards net zero.
- **Negligible (not significant):** the GHG impacts are reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050.
- **Beneficial (significant):** the net GHG impacts are below zero, causing a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline, substantially exceeding net zero requirements with a beneficial climate impact.

13.4.44. In order to provide context to the GHG emissions, and as set out in the IEMA Guidance[29] the estimated GHG emissions arising from the Proposed Scheme will be compared with the respective UK carbon budgets, shown in **Table 13-3,** which have been set by the UK Government covering 2023 to 2037.

Table 13-3: GHG UK Carbon Budgets[9,13]

Carbon Budget Period	UK Carbon Budget
Fourth: 2023-2027	1,950 $MtCO_2e$
Fifth: 2028-2032	1,725 $MtCO_2e$
Sixth: 2033-2037	965 $MtCO_2e$

13.4.45. Although recent case law has made it clear that there is no obligation to do so, further contextualisation against the London carbon budgets will also be considered, see **Table 13-4** below to provide further context.

Table 13-4: GHG – London Carbon Budgets[36]

Carbon Budget Period	London Carbon Budget
2018-2022	27.1 $MtCO_2e$
2023-2027	22.4 $MtCO_2e$
2028-2032	18 $MtCO_2e$

13.4.46. To provide additional context, a breakdown of GHG Emissions for 2021 within Bexley, London, and the UK (as reported by UK National Statistics[37]) are presented in **Table 13-5**.

Table 13-5: GHG Emissions Sources for Bexley, London and the UK (2021)

Emissions Sources	Bexley ($ktCO_2e$)	London ($ktCO_2e$)	UK ($ktCO_2e$)
Industry Electricity	39	1,192	17,109
Industry Gas	110	883	20,037
Large Industrial Installations	0.5	46	29,268
Industry 'Other'	30.6	941.4	17,927
Industry Total	**180**	**3,063**	**84,341**
Commercial Electricity	26	2,325	10,964
Commercial Gas	15.5	1,354.5	6,239
Commercial 'Other'	0.4	27	223
Commercial Total	**42**	**3,707**	**17,426**
Public Sector Electricity	15	1,163	5,380
Public Sector Gas	16	1,864.6	10,581
Public Sector 'Other'	0.0	0.3	63
Public Sector Total	**31**	**3,028**	**16,024**
Domestic Electricity	75	2,616	22,245
Domestic Gas	243	8,058	63,613
Domestic 'Other'	3	93	11,064
Domestic Total	**321**	**10,767**	**96,921**
Landfill	10	1,550	13,618
Waste Management 'Other'	18	387	5,196
Waste Management Total	28	1,937	18,814
Other Total (transport, land use, land use change, forestry and agriculture)	215	7,446	165,520
Grand Total	**816**	**29,948**	**399,046**

13.5. STUDY AREA

13.5.1. The GHG assessment is not restricted by geographical area but instead includes any increase or decrease in emissions as a result of the Proposed Scheme, wherever that may be. This includes:

- construction emissions within the Site Boundary but also related to the transport of materials to and from the Proposed Scheme and their manufacture (this may be distant from the Proposed Scheme location); and
- operation emissions (increase or reduction) which result from the operation of the Proposed Scheme. In this case, GHG emissions include those for embodied emissions arising from materials and waste for the operation of the Proposed Scheme, carbon capture and operational energy and water use.

BASELINE

13.5.2. In the baseline, GHG emissions occur constantly and widely as a result of natural and human activity, including land use and land use change, energy consumption (e.g., fossil fuels, purchased energy from the grid and/or other sources) and industrial processes. The GHG assessment would only consider the scenario in which the Proposed Scheme results in additional or avoided emissions in comparison to the baseline. The baseline therefore focus on those sources of emissions subject to change between the baseline and the Proposed Scheme.

13.5.3. The baseline for the Proposed Scheme will include Riverside 1 operating, without Riverside 2.

13.5.4. The construction baseline involves no construction activities and therefore the construction baseline is zero emissions.

13.5.5. The baseline in this PEIR chapter does not include emissions (beneficial or adverse) associated with Munster Joinery and Crossness LNR, if available this will be included in the baseline presented in the ES.

13.5.6. Riverside 1 is one of the largest EfW facilities in the UK, with a maximum waste throughput of 850,000 tonnes per annum (tpa); it received 789,000 tonnes of non-recyclable waste in 2022. The maximum waste throughout will form the basis of the operational baseline for Riverside 1. Heat produced from the combustion process drives a turbine to generate electricity, enough to power 195,000 homes[38].

FUTURE BASELINE

13.5.7. The future baseline will take into consideration any changes to the quantity of residual waste incinerated at Riverside 1 and will assume that Riverside 2 is in operation. For both Riverside 1 and Riverside 2, operation is assumed to be at consented maximum throughput for processing waste (and thus producing GHG) into the future. The operation of the Proposed Scheme will not change this.

13.5.8. Therefore, the future baseline for Riverside 1 will be 850,000 tpa of waste (equating to approximately 892,500 tCO_2e).

13.5.9. Riverside 2 will be operational in 2026 and be one of the most efficient EfW facilities in the UK. Riverside 2 is consented to have a maximum waste throughput of 805,920 tpa of non-recyclable waste (equating to approximately 717,269 tCO_2e).

13.5.10. **Table 13-6** below outlines the baseline and future baseline results for the Proposed Scheme.

Table 13-6: Baseline and Future Baseline Emissions of the Proposed Scheme

Description	Total Baseline and Future Baseline GHG emissions for operation of Riverside 1 and Riverside 2 (tCO_2e)
2026 Start of scheme construction. Riverside 1 and 2 annual emissions (assuming both in operation in 2026)	1,609,769
Total (2026 to 2080)	**88,537,284**

13.6. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

13.6.1. This section sets out the embedded design, mitigation and enhancement measures relevant to the GHG assessment.

CONSTRUCTION PHASE

13.6.2. The embedded design, mitigation and enhancement measures for the construction phase are:

- Preliminary work indicates that excavated arisings will be reused on the Proposed Scheme, where suitable, though there is not yet full certainty of the potential to achieve this outcome.
- Environmental mitigation required during construction will be recorded in the OCoCP to be submitted as part of the application for a development consent. The OCoCP will provide a tool to ensure the successful management of the likely environmental effects as a result of construction activities. A Framework Construction Traffic Management Plan will be prepared as an appendix to the OCoCP.
- Creation of a GHG Reduction Strategy, which will be prepared and presented alongside the ES.
- Taking into account the potential carbon emissions within the design of the Mitigation Area and Environmental Mitigation Opportunity Areas.
- Further embedded measures on material reuse and recycling are outlined in **Chapter 16: Materials and Waste (Volume 1)**, which will result in reductions in construction waste emissions and also embodied GHG emissions from materials where re-use of the material can be favoured onsite.

13.6.3. Further embedded mitigation construction measures will be set out in the ES, once known and certain.

OPERATION PHASE

13.6.4. Embedded mitigation measures for operation include maximising efficiencies in the use of materials for the Carbon Capture Facility and the Proposed Jetty.

13.6.5. The mitigation measures for the operation phase are expected to be included in the GHG Reduction Strategy prepared and presented alongside the ES.

13.7. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

13.7.1. This section details the preliminary assessment of impacts and effects for the Proposed Scheme during both the construction and operation phases (as detailed in **Section 13.4**), taking into account the embedded design, mitigation and enhancement measures detailed in **Section 13.6.**

13.7.2. The demolition or retention of the Belvedere Power Station Jetty (disused) will not change the outcomes of the preliminary assessment of impacts and effects reported within this chapter. Though the absolute GHG emissions would change for the construction phase, the choice between the demolition or retention of the disused jetty is not expected to have a material enough impact to change the likely conclusion on the effects reported, given the size of the other numbers considered in this assessment, although this will be assessed and confirmed in the ES

CONSTRUCTION PHASE

13.7.3. **Table 13-7** below presents the preliminary construction phase GHG emissions for the Proposed Scheme.

Table 13-7: Proposed Scheme Estimated Construction GHG Emissions

Emissions Sources	Emissions* (tCO_2e)
Product Stage (manufacture and transport of raw materials to suppliers) (A1-3)	30,544
Transport of Materials to Site (A4)	4,051
Plant and Equipment Use during Construction (A5)	1,000
Transport of Waste (A5)	172
Disposal of Waste (A5)	21
Land use, Land Use Change And Forestry (A5)	(to be assessed at ES)
Total	**35,790**

13.7.4. The total estimated construction GHG emissions of the Proposed Scheme is 35,790 tCO_2e; albeit not including Land Use, Land Use Change and Forestry (A5). The assessment indicates that embodied emissions (Product Stage (A1-3)) make up 85% of the total construction GHG emissions. The next largest contributor at 11% is for the Transport of Materials to Site (A4), with the remaining elements attributing less than 3% each. These estimated emissions will be updated and revised for the ES.

OPERATION PHASE

13.7.5. **Table 13-8** below presents the preliminary operational phase GHG emissions relative to the baseline for the Proposed Scheme.

Table 13-8: Proposed Scheme Estimated Operation GHG Emissions Relative to Baseline

Emissions Sources	Emissions per Annum (tCO_2e)
CO_2 captured through the Carbon Capture process (B1)	-1,529,280
Operation Refrigerants (B1)	(to be assessed at ES)
Maintenance, Repair, Replacement, Refurbishment (B2-5)	(to be assessed at ES)
Operational Energy Use (B6)	6
Operational Water Use (B7)	<0.5
Land Use, Land Use Change and Forestry (B8)	(to be assessed at ES)
Solvent Used for the Operation of the Proposed Scheme (B8)	185
End-user emissions (B9/D) (Transport)	23,634
Total	**-1,505,455**

13.7.6. The potential likely significant effects for GHG emissions associated with the operational phase are set out below.

13.7.7. Given the current data gaps, the calculation of GHG emissions for the Proposed Scheme is currently incomplete. However, the probability of the Proposed Scheme to be ‘carbon negative’ i.e., result in a reduction in emissions of GHG emissions to the atmosphere relative to the baseline, is highly likely. This is because the carbon emissions associated with the operation of the Carbon Capture Facility are not expected to outweigh the carbon saved from being emitted to the atmosphere.

13.7.8. The operational emissions for Solvent Used (B8) currently includes emissions from Sodium Hydroxide use. There are other solvents that have not been included in the PEIR assessment due to unavailability of data at the time of writing (not expected to make a material difference to the results), however these will be included in the ES.

PROPOSED SCHEME LIFECYCLE IMPACTS

13.7.9. The lifecycle impacts associated for the Proposed Scheme, representing each scenario, are as set out in **Table 13-9** and illustrated below in **Figure 13-1: GHG – Illustrated Scope of the Baseline and the Proposed Scheme**.

Table 13-9: Proposed Scheme Total GHG Emissions

Scenario	Data Period	Emissions (tCO_2)
Baseline	2026-2080	88,537,284
Proposed Scheme (Construction)	2026-2030	35,790
Proposed Scheme (Operation)	2031-2080	-75,272,754
Emissions saving from Proposed Scheme (relative to future baseline)	2031-2080	-76,464,018

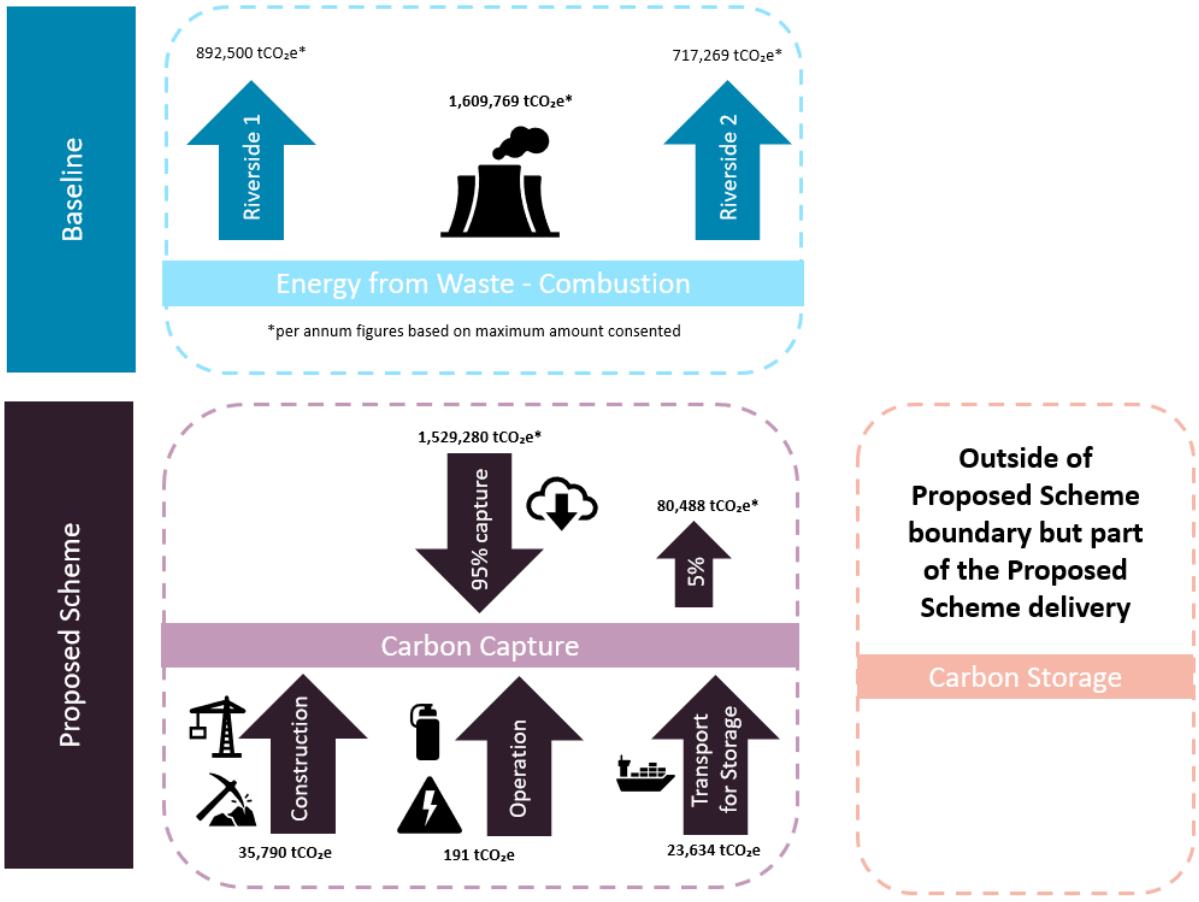

Figure 13-1: GHG – Illustrated Scope of the Baseline and the Proposed Scheme

EMISSIONS CONTEXT

13.7.10. To aid in the determination of significance in line with the methods outlined in **Section 13.4**, the carbon dioxide emissions from the Proposed Scheme, as currently calculated, have been presented in the context of the UK's Carbon Budgets in **Table 13-10** and the London Carbon Budgets in **Table 13-11.**

Table 13-10: Proposed Scheme GHG Emissions with UK Carbon Budgets

Carbon Budget Period	UK Carbon Budget tCO_2e	Proposed Scheme Emissions tCO_2e	Proportion of Carbon Budget (%)
Fourth: 2023-2027	1,950,000,000	14,316	0.001
Fifth: 2028-2032	1,725,000,000	-7,505,802	-0.435
Sixth: 2033-2037	965,000,000	-7,527,275	-0.780

Table 13-11: Proposed Scheme GHG Emissions with London Carbon Budgets

Time Period	Carbon Budget tCO_2e	Proposed Scheme Emissions tCO_2e	Proportion of Carbon Budget (%)
2023-2027	22,400,000	14,316	0.064
2028-2032	18,000,000	-7,505,802	-41.699

13.7.11. Further context will be provided within the ES, GHG emissions will also be presented against the targets in the Carbon Budget Delivery Plan and will be modelled to indicate the carbon payback period. The carbon payback period will represent the time it takes for carbon emissions calculated for the construction and operational phases to be offset by the savings in carbon emissions from the Proposed Scheme.

CONSTRUCTION PHASE

13.7.12. Based on the preliminary assessment, the construction phase will result in an increase in GHG emissions compared to the baseline.

13.7.13. Due to the scale of emissions, there is likely to be a direct, permanent, long term, **moderate adverse (significant)** effect. As noted above, the time taken for GHG emissions calculated for the construction phase to be offset by savings in GHG emissions from the wider Proposed Scheme will be included in modelling of the carbon payback period and presented within the ES.

13.7.14. In relation to the IEMA Guidance[29], the GHG impacts are expected to be partially mitigated (by the measures set out at **Section 13.6**) and therefore may partially meet the applicable existing and emerging policy requirements. However, they would not fully contribute to decarbonisation in line with local and national policy goals, falling short of fully contributing to the UK's trajectory towards net zero.

OPERATION PHASE

13.7.15. The outcome of the preliminary assessment for the operational phase suggests that it will result in a substantial decrease in GHG emissions compared to the baseline scenario.

13.7.16. The technology to be used for the Proposed Scheme has an estimated minimum capture rate of 95% of all CO_2 from Riverside 1 and Riverside 2. This equates to 847,875 and 681,405 (tCO_2e) respectively per annum, a total of 1,529,280 tCO_2e.

13.7.17. Due to the scale of emissions, there is likely to be a direct, permanent, long term, **beneficial (significant)** effect. This is because it is anticipated that the net GHG impacts are below zero and will cause a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the baseline, substantially exceeding net zero requirements with a beneficial climate impact.

13.8. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

13.8.1. This section sets out the additional design, mitigation or enhancement measures that could be considered to reduce GHG emissions.

DESIGN EVOLUTION

13.8.2. Potential measures to reduce GHG emissions during the design of the Proposed Scheme to DCO application could include:

- Detailed design optimisation to reflect the PAS 2080:2023[25] carbon reduction hierarchy.
- Reduce the requirement for construction materials (designing out material redundancy), where practicable.
- Substitute construction elements for lower-carbon alternatives where practicable;
- Consider the specification of materials and products with reduced embodied GHG emissions including through material substitution, recycled or secondary content and from renewable sources;
- Consider the sustainability credentials of material suppliers and construction contractors and, where practicable, to take into account their policies and commitments to reduction of GHG emissions, including embodied emission in materials.
- Designing, specifying and constructing the Proposed Scheme with a view to maximising the operational lifespan and minimising the need for maintenance and refurbishment (and all associated emissions).

- Designing, specifying and constructing the Proposed Scheme with a view to maximising the potential for re-use and recycling of materials/elements at the end-of-life stage.
- Consider opportunities to minimise operational energy use, including the specification of efficient plant and ancillary infrastructure.

CONSTRUCTION PHASE

13.8.3. Measures to reduce GHG emissions during the construction of the Proposed Scheme will be set out in a OCoCP. The OCoCP will provide a review, monitoring and audit mechanism to determine the effectiveness of, and compliance with, environmental control measures, which include the consideration of manufacture, transport and supply of materials. Measures incorporated into the OCoCP will include:

- Use of efficient construction processes, such as design for manufacture and assembly.
- Implementation of a Site Waste Management Plan (SWMP) and Materials Management Plan (MMP) by the Contractor; and re-use of material resources where practicable.
- Specification of materials and products with reduced embodied GHG emissions including through material substitution, recycled or secondary content and from renewable sources.
- Recovery and re-use/recycling of site arisings (ideally, onsite).
- Selection and engagement of materials suppliers and construction contractors taking into account their proximity to the Proposed Scheme, as well as policies and commitments to reduction of GHG emissions, including embodied emission in materials.
- Use of efficient plant, including hybrid and electric plant as appropriate.

OPERATION PHASE

13.8.4. Operational enhancement measures to meet the anticipated GHG emission reduction will require the Carbon Capture Facility to capture as much CO_2 as practicable and maintain, as a minimum, the expected 95% carbon capture rate. This may be achieved through:

- Selection of best available techniques (BAT) for equipment and technology specifications which will optimise carbon capture rates secured through the environmental permit.
- Development and implementation of a planned and preventative maintenance and replacement regime to ensure operation of the plant remains efficient for the minimum design life.

13.9. MONITORING

13.9.1. Beyond the measures to be included in the OCoCP, no monitoring of GHG effects is expected to be required.

13.10. RESIDUAL EFFECTS

13.10.1. **Table 13-12** below summarises the residual effects associated with the Proposed Scheme.

Table 13-12: GHG - Summary of Residual Effects

Description of the Impact	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual effect
Construction Phase				
GHG Emissions	Global Atmosphere	**Moderate Adverse (significant)**	Construction emissions could be minimised through design optimisation in line with PAS 2080:2023[25] principles to reflect the carbon reduction hierarchy as well as other measures detailed in **Section 13.8**.	**Minor Adverse (not significant)**
Operational Phase				
GHG Emissions	Global Atmosphere	**Beneficial (significant)**	N/A	**Beneficial (significant)**

13.11. NEXT STEPS

13.11.1. Further work to be completed and included in the ES comprises:

- The GHG assessment will be further developed and refined based on any relevant responses to the Statutory Consultation.
- The detailed assessment within the ES will involve a review of the GHG assessment presented in this technical chapter, based on further information as part of ongoing design development in accordance with the methodologies outlined in **Section 13.4** above.
- An assessment of:
  - Land use, Land Use Change And Forestry – A5 (Construction Phase): Emissions from the change in land use will be calculated using the outcomes of the BNG Assessment (described in **Chapter 7: Terrestrial Biodiversity (Volume 1).**
  - Land use, Land Use Change And Forestry – B8 (Operation Phase): Emissions from the change in land use will be calculated using the outcomes of the BNG Assessment (described in **Chapter 7: Terrestrial Biodiversity (Volume 1).**
  - Operation – B1 (Operation Phase): Emissions from operational waste and refrigerant use will be calculated.
  - Replacement & Refurbishment Emissions – B2-B5 (Operation Phase): There will be some components of the Proposed Scheme which may not last for the entire lifetime of the Proposed Scheme and thus will need to be replaced and their embodied emissions to be accounted for.
  - Operational energy consumption - B6 (Operation Phase): Whilst energy demand for the Proposed Scheme is expected to be sourced from Riverside 1 and 2, albeit there may be a limited demand for electricity from the grid at certain times, there are emissions associated with this. Further data is required, to calculate the emission factor of Riverside 1 and 2. This will be accounted for at the ES stage.
  - Solvent used for the Carbon Capture process – B8 (Operation Phase): Additional solvents such as amine will be included in the ES assessment.
  - Overall, good practice opportunities to minimise and manage GHG emissions during the construction and operation phases will be further outlined in the ES.

13.12. LIMITATIONS AND ASSUMPTIONS

13.12.1. The following limitations and assumptions have been identified:

- The most accurate and representative emission factors have been used where practicable, however in some circumstances (e.g. where that level of detail is not available, or if the exact emission factors were not available) a suitable representative emission factor was chosen using professional judgement.
- Some items in the preliminary BoQ were not available in the format required for the selected emission factor to be applied. In these instances, assumptions have been made in regard to dimensions or specification to obtain the correct values, based on publicly available information of similar products or industry standard.
- The assessment of significance will be based, in part, on professional judgement.

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DECARBONISATION

CHAPTER 14: POPULATION, HEALTH AND LAND USE

Cory Decarbonisation Project

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TABLE

14. POPULATION, HEALTH AND LAND USE

14.1. INTRODUCTION

14.1.1 This chapter reports the preliminary assessment of the likely significant effects of the Proposed Scheme on population, health and land use during construction and operation and describes:

- relevant policy, legislation and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operational phase.

14.2. POLICY, LEGISLATION AND GUIDANCE

14.2.1 The policy, legislation, and guidance relevant to the assessment of population, health and land use for the Proposed Scheme is detailed in **Table 14-1**.

Table 14-1: Population, Health and Land Use Summary of Key Policy, Legislation, and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011[1]	Sets out the Government's policy for delivery of major energy infrastructure and is currently the primary basis for decision making of applications within the Planning Act 2008 regime. Paragraph 4.2.2 states *"To consider the potential effects, including benefits, of a proposal for a project, the Infrastructure Planning Commission will find it helpful if the applicant sets out information on the likely significant social and economic effects of the development, and shows how any likely significant negative effects would be avoided or mitigated. This information could include matters such as employment, equality, community cohesion and well-being".*

Policy, Legislation or Guidance	Description
	Paragraph 5.10.5 states *"The ES (see Section 4.2) should identify existing and proposed land uses near the project, any effects of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site from continuing. Applicants should also assess any effects of precluding a new development or use proposed in the development plan".* Paragraph 5.10.6 states that *"Applicants will need to consult the local community on their proposals to build on open space, sports or recreational buildings and land. Taking account of the consultations, applicants should consider providing new or additional open space including green infrastructure, sport or recreation facilities, to substitute for any losses as a result of their proposal. Applicants should use any up-to-date local authority assessment or, if there is none, provide an independent assessment to show whether the existing open space, sports and recreational buildings and land is surplus to requirements".* In Policy G3 of the London Plan 2021, Metropolitan Open Land is afforded the same status and level of protection as Green Belt, and therefore the following paragraphs of NPS EN-1 are also applicable: Paragraph 5.10.10 states *"The general policies controlling development in the countryside apply with equal force in Green Belts but there is, in addition, a general presumption against inappropriate development within them. Such development should not be approved except in very special circumstances. Applicants should therefore determine whether their proposal, or any part of it, is within an established Green Belt and if it is, whether their proposal may be inappropriate development within the meaning of Green Belt policy".*

Policy, Legislation or Guidance	Description
	Paragraph 5.10.17 states *"When located in the Green Belt, energy infrastructure projects are likely to comprise 'inappropriate development'134. Inappropriate development is by definition harmful to the Green Belt and the general planning policy presumption against it applies with equal force in relation to major energy infrastructure projects. The IPC will need to assess whether there are very special circumstances to justify inappropriate development. Very special circumstances will not exist unless the harm by reason of inappropriateness, and any other harm, is outweighed by other considerations. In view of the presumption against inappropriate development, the IPC will attach substantial weight to the harm to the Green Belt when considering any application for such development while taking account, in relation to renewable and linear infrastructure, of the extent to which its physical characteristics are such that it has limited or no impact on the fundamental purposes of Green Belt designation".*
Draft Overarching National Policy Statement (NPS) for Energy EN-1 2023[2]	This Draft Overarching NPS for Energy (EN-1) is part of a suite of draft NPSs issued by the Secretary of State for DESNZ. It sets out the government's policy for delivery of major energy infrastructure and will likely replace the 2011 NPSs by the time the application for the Proposed Scheme is submitted. Paragraph 4.3.4 states *"As described in the relevant sections of this NPS and in the technology specific NPSs, where the proposed project has an effect on humans, the ES should assess these effects for each element of the project, identifying any potential adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate".* Paragraph 5.11.1 states *"An energy infrastructure project will have a direct effect on the existing use of the proposed site and may have indirect effects on the use, or planned use, of land in the vicinity for other types of development. Given the likely locations of energy infrastructure projects there may be particular effects on open space including green and blue infrastructure".*

Policy, Legislation or Guidance	Description
	Paragraph 5.11.6 states *"The government's policy is to ensure there is adequate provision of high-quality open space and sports and recreation facilities to meet the needs of local communities. Connecting people with open spaces, sports and recreational facilities all help to underpin people's quality of life and have a vital role to play in promoting healthy living".* Paragraph 5.11.7 states "*Green and blue infrastructure can also enable developments to provide positive environmental, social, health and economic benefits. Green infrastructure includes green space such as parks and woodlands but also other environmental features such as street trees, hedgerows and green walls and roofs. It also includes blue infrastructure such as canals, rivers, streams, ponds lakes and their borders. Well designed and managed green and blue infrastructure provides multiple benefits at a range of scales. It can contribute to biodiversity recovery, sequester carbon, absorb surface water, cleanse pollutants, absorb noise and reduce high temperatures".* Paragraph 5.11.8 states *"The ES should identify existing and proposed land uses near the project, any effects of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site from continuing. Applicants should also assess any effects of precluding a new development or use proposed in the development plan. The assessment should be proportionate to the scale of the preferred scheme and its likely impacts on such receptors. For developments on previously developed land, the applicant should ensure that they have considered the risk posed by land contamination and how it is proposed to address this".* Paragraph 5.11.9 states *"Applicants will need to consult the local community on their proposals to build on existing open space, sports or recreational buildings and land. Taking account of the consultations, applicants should consider providing new or additional open space including green and blue infrastructure, sport or recreation facilities, to substitute for any losses as a result of their proposal".*

Policy, Legislation or Guidance	Description
	Paragraph 5.11.10 states that *"Applicants should use any up-to-date local authority assessment or, if there is none, provide an independent assessment to show whether the existing open space, sports and recreational buildings and land is surplus to requirements".*
National Planning Policy Framework (NPPF) 2021[3]	The NPPF sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally prepared plans for housing and other development can be produced. Paragraph 92 states that "*Planning policies and decisions should aim to achieve healthy, inclusive and safe places".* Paragraph 93 states "*To provide the social, recreational and cultural facilities and services the community needs, planning policies and decisions should:* *a) plan positively for the provision and use of shared spaces, community facilities (such as local shops, meeting places, sports venues, open space, cultural buildings, public houses and places of worship) and other local services to enhance the sustainability of communities and residential environments;* *b) take into account and support the delivery of local strategies to improve health, social and cultural well-being for all sections of the community;* *c) guard against the unnecessary loss of valued facilities and services, particularly where this would reduce the community's ability to meet its day-to-day needs;* *d) ensure that established shops, facilities and services are able to develop and modernise, and are retained for the benefit of the community; and* *e) ensure an integrated approach to considering the location of housing, economic uses and community facilities and services".*
The London Plan 2021[4]	The Spatial Development Strategy for Greater London sets out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policies relevant to the population, health and land use assessment are: • GG1: Building Strong and Inclusive Communities; • GG3: Creating a Healthy City; • D1: London's Form, Character and capacity for Growth;

Policy, Legislation or Guidance	Description
	• D14: Noise; • SI1: Improving Air Quality; • T2: Healthy Streets; and • T4: Assessing and Mitigating Transport Impacts (which covers the walking and cycling network).
The Bexley Local Plan 2023[5]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development across the Borough. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy, and the Connected Communities Strategy. Relevant policies to the population, human health and land use assessment include: • DP15: Providing and Protecting Social and Community Infrastructure; • DP17: Publicly Accessible Open Space; • SP7: Social and community services and facilities; • SP8: Green Infrastructure including designated green space; • SP9: Protecting and enhancing biodiversity and geological assets; • DP15: Social and Community Infrastructure; and • DP16: Health impact assessments.
London Environment Strategy 2018[6]	The London Environment Strategy contains the aim to improve "*air, noise pollution, threats to our green spaces, and the adverse effects of climate change*" these all pose as risks to the health and wellbeing of residents in London. As set out in the Strategy, the state of London's environment affects everyone who lives in and visits the city – it helps Londoners to stay healthy, allows businesses to thrive and keeps London functioning from day to day.
Bexley Open Space Strategy 2008[7]	The Bexley Open Space Strategy sets a framework for the future planning and management of open spaces, outdoor sport and recreation facilities by encouraging various service areas to effectively plan for the future delivery and implementation of improvements.

Policy, Legislation or Guidance	Description
Bexley Growth Strategy 2017[8]	The Bexley Growth Strategy sets out the coordinated effort across organisations to maximise the benefits of growth for the borough's current and future residents and businesses. It details how the Council, working with a range of partners, proposes to positively manage housing and economic growth and its associated supporting infrastructure in the borough into the future. The Strategy covers a 30-year period to 2050.
Bexley Connected Communities 2019 – 2023[9]	Bexley's Connected Communities strategy sets out how the Council will work with local people who want to take positive action to support the people and places that they care about. It outlines the Borough's plans for supporting and investing in community development up to 2023.
South East Inshore Marine Plan 2021[10]	The South East Inshore Marine Plan area stretches from Felixstowe in Suffolk to west of Dover in Kent and incorporates the River Thames. The South East Inshore Marine Plan will help to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan area. Relevant policies to the population, human health and land use assessment include: • SE-CO-1: Co-existence; • SE-PS-1: Ports, Harbours and Shipping; • SE-ACC-1: Access; • SE-TR-1: Tourism and Recreation; and • SE-SOC-1: Social Benefits.
Legislation	
Environment Act 2021[11]	The Environment Act 2021 makes provision about targets, plans and policies for improving the natural environment. Part 1 (Environmental Targets) Regulation 1 (1) states: "*The Secretary of State may by regulations set long-term targets in respect of any matter which relates to— (a) the natural environment, or (b) people's enjoyment of the natural environment*".

Policy, Legislation or Guidance	Description
Countryside and Rights of Way (CROW) Act 2000[12]	The CROW Act makes provision for and aims to protect public access to the countryside. The Act extends the right of public access to the countryside, including to woodlands, the Green Belt, waters and grasslands; and for connected purposes.
Equality Act 2010[13]	The Act legally protects people from discrimination in the workplace and in wider society. It aims to protect the following characteristics from discrimination: • Age; • Disability; • Gender reassignment; • Marriage and civil partnership; • Pregnancy and maternity; • Race; • Religion or belief; • Sex; and • Sexual orientation.
Localism Act 2011[14]	The Localism Act gives rights and powers to both communities and individuals, making it easier for them to get things done and achieve their ambitions for the place where they live. The Act introduces a Community Right to Bid (Assets of Community Value) which aims to ensure that buildings and amenities can be kept in public use and remain an integral part of community life. A building or piece of land will be deemed to have community value only if: • The use of the land or building currently, or in the recent past, furthers the social well-being or cultural, recreational or sporting interests of the local community. • This use (as described above) of the building will continue to further the social well-being or interests of the local community. • The use of the building or land must not be deemed 'ancillary', i.e. of secondary purpose. This means that the use of the land or building to further social well-being or interests of the community must be its primary use.

Policy, Legislation or Guidance	Description
Guidance	
IEMA 2022 Guidance 'Determining Significance for Human Health in Environmental Impact Assessment'[15]	This guidance covers the consideration of health as a topic in EIA. It presents a framework that supports a proportionate approach that can apply to all scales of EIA. The guidance provides health, sensitivity and health magnitude tables. It also sets out how to provide an evidence-based narrative to explain why the change is or is not significant for public health. The guidance also outlines that a population health approach should be taken when determining significance. It also notes that the potential for health inequalities needs articulating in 'significance conclusions' to determine if any specific mitigation should be put in place or monitoring is required.
Planning Practice Guidance – Open Space, Sports and Recreation Facilities, Public Rights of Way (ProW) and Local Green Space 2014[16]	This sets out guidance on how new planning proposals should consider potential impacts on open space, sports and recreation facilities and ProW.
Planning Practice Guidance – Healthy and Safe Communities 2014[17]	This sets out guidance on how new planning proposals should promote health, wellbeing and safety.
Design Manual for Roads and Bridges (DMRB) guidance Volume 11, Section 3, Part 6, LA112 Population and Human Health[18]	This document provides a framework for assessing, mitigating and reporting the effects of motorway and all-purpose trunk road projects on population and human health. It introduces significance criteria that aid consistent and proportionate assessment to support the reporting of significant effects of population and human health. Although this guidance is not directly applicable to the nature of the Proposed Scheme, it still provides a good basis for determining sensitivity and magnitude of effects.

Policy, Legislation or Guidance	Description
UK Health Security Agency (formally Public Health England) Health and Environmental Impact Assessment: A Briefing for Public Health Teams in England, 2017[19]	This briefing note aims to raise awareness amongst Directors of Public Health (DsPH) and their public health teams about Environmental Impact Assessment (EIA). It identifies when and how public health teams can contribute to the EIA process. This note is part of Public Health England's work to describe and demonstrate effective, practical local action on a range of wider determinants of health.

14.3. SCOPING OPINION AND CONSULTATION

14.3.1 An EIA Scoping Opinion[20] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26th May 2023. The responses from the Planning Inspectorate in relation to population, health and land use and how these requirements will be addressed by the Applicant are set out in **Table 14-2** below.

Table 14-2: Summary of the EIA Scoping Opinion in relation to Population, Health and Land Use

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Planning Inspectorate			
3.10.1	Impacts on terrestrial businesses – operation	*"The Scoping Report explains that access may be temporarily disrupted during construction but does not identify any operational impacts. Considering the nature and characteristics of the operational Proposed Scheme, the Inspectorate agrees that impacts on terrestrial businesses during operation are not likely to result in significant effects and that this matter can be scoped out."*	No response required.
3.10.2	Impacts on community land and assets – construction and operation	*"Having regard to the nature and characteristics of the Proposed Scheme and the distance from community land and assets (as set out in paragraph 13.3.11 of the Scoping Report), the Inspectorate agrees that impacts on community land and assets during construction and operation are not likely to result in significant effects. This matter can be scoped out."*	No response required.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.10.3	Impacts on private property and housing – construction and operation	*"Due to the nature of the Proposed Scheme, its location within an existing industrial area and the temporary duration of construction works, the Inspectorate does not consider that significant effects are likely. Impacts on private property and housing during construction and operation can be scoped out of the ES."*	No response required.
3.10.4	Standalone Human Health ES Chapter	*"The Scoping Report proposes that impacts on human health will be considered within the ES Technical Chapters on Air Quality, Noise and Vibration, Townscape and Visual, Socio-Economics and Landside Transport. It is proposed that the ES would include an appendix to cross-reference to where impacts on human health are considered.* *The Inspectorate is content that a standalone Human Health ES Chapter is not required. To ensure that relevant assessments can be easily located, the Inspectorate recommends that the EIA Methodology ES chapter (rather than an ES appendix) provides clear cross-referencing to where the relevant impacts on human health are considered."*	**Section 14.8** of this chapter provides clear cross-referencing to where human health has been considered within other environmental topics. As set out in **Section 14.8**, the outcomes of the other environmental assessments have been considered and the overall impact on human health determined in this chapter. The IEMA 2022 Guidance 'Determining Significance for Human Health In Environmental Impact Assessment'[15], has informed this exercise (and is included in **Table 14-1** above).

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		The assessment should be Informed by relevant guidance such as the Institute of Environmental Management and Assessment (IEMA) 2022 guidance 'Determining Significance for Human Health In Environmental Impact Assessment'. *The Applicant's attention is drawn to comments from the UK Health Security Agency (UKHSA) (Appendix 2 of this Opinion) regarding potential impacts on mental health through risk perception/understanding of risk posed by the manufacture, storage and transportation of hydrogen and other hazardous substances. The Applicant should make effort to discuss and agree the requirement for and approach to any assessment of this matter with the UKHSA."*	Mental health and wellbeing has been included within this chapter. The methodology for the assessment is set out in **Section 14.4** and the assessment findings are set out in **Section 14.8**. Whilst the Hydrogen Project and the battery energy storage system are no longer a part of the ongoing Proposed Scheme design as set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, the UKHSA has been consulted regarding the approach to the mental health assessment and any changes to the assessment approach and findings will be presented in the ES.
3.10.5	Scope of assessment – tourism	*"The Scoping Report identifies recreational facilities that may be impacted by the Proposed Scheme (some of which appear to be tourism facilities) but does not specifically explain if/ how impacts on tourism are to be considered as part of the socio-economic assessment. Impacts on tourist businesses should be assessed in the ES where significant effects are likely."*	**Section 14.4** sets out the methodology used to assess the impacts of the Proposed Scheme on terrestrial and marine businesses as well as recreational users of the River Thames. **Section 14.8** provides the findings of the assessments in relation to these receptors. Additionally, the chapter sets out where these receptors are also considered to be tourist receptors and the impacts to them are set out.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			Chapter 15: Socio-economics (Volume 1) of this PEIR sets out the socio-economics assessment, which considers employment generation and Gross Value Added (GVA) as a result of the Proposed Scheme. A separate tourism economy assessment has not been included in **Chapter 15: Socio-economics (Volume 1)** of this PEIR as those businesses affected are not tourism related businesses due to the industrial location of the Proposed Scheme.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.10.6	Impacts on users of pRoW, long distance walking routes and National Cycle Network (NCN) routes (severance, delay, amenity and fear/ intimidation)	*"The Scoping Report notes that the Proposed Scheme is likely to impact on users of pRoW, long distance walking routes and/or NCN routes, including from a likely permanent diversion of a pRoW.* *The ES should assess impacts to users of pRoW, long distance walking routes and NCN routes (including severance, delay, amenity and fear/ intimidation) during construction and operation which are likely to result in significant effects. Any such assessment should be supported by pedestrian/ user counts where necessary and possible (if adequate usage data cannot be obtained from the LPA), with effort made to agree the locations for such counts with relevant consultation bodies. Where relevant, the ES should assess potential interactions between aspect assessments (for example traffic and transport, noise, dust, recreation and visual impact).* *The locations of any diversions or closures should be illustrated on suitable figures in the ES."*	As set out in **Section 14.4** and **Section 14.8**, the potential impacts to users (walkers and cyclists) of pRoW, long distance walking routes and NCN routes (including severance, delay, amenity and fear/intimidation) have been considered during construction and operation of the Proposed Scheme. As detailed in **Section 14.8**, the potential interactions between assessments (for example traffic and transport, noise, dust, recreation and visual impact) on such users will be considered within **Chapter 21: Cumulative Effects (Volume 1)** of the ES. The methodology for the cumulative effects assessment is detailed in **Chapter 21: Cumulative Effects (Volume 1)** of this PEIR.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			Consultation has been undertaken with LBB to ascertain further information on the current conditions and user counts for the affected pRoW, long-distance walking routes and NCN routes. As LBB does not have any pRoW usage data, a usage and condition survey will be undertaken to inform the ES. Further details on the consultation with LBB are provided in **Table 14-3**. Any diversion(s) will be clearly set out and assessed within the ES, which will include a figure illustrating the diversions. The potential for PROW diversion is being explored both within the Site and outside of the Site Boundary as part of ongoing design development. Further discussions will be required with LBB, with relevant powers contained within the DCO if necessary.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
London Borough of Bexley			
N/A	N/A	*Policies SP9 and DP15 of the Bexley Local Plan (2023) set out the local policy approach to protect Social and community services and facilities. Examples of types of social and community services and facilities identified in Table 10 of the Local Plan, include accessible open space and accessible nature areas. The Crossness Nature Reserve and accessible parts of the Sites of Importance for Nature Conservation provide an important community service and facility.*	Policies SP9 and DP15 have been included in **Table 14.1**.
N/A	N/A	*The Crossness Nature Reserve and SINC are designated not only for their significance for wildlife, but also for their value to people. Access to nature has significant health and wellbeing benefits by allowing people to connect with nature.*	The baseline presented within this technical chapter makes it clear that the Crossness LNR and SINC are designated not only for their significance for wildlife, but also for their value to people, recognising the health and wellbeing benefits brought through connection with nature. This chapter assesses the impacts of the Proposed Scheme on the Crossness LNR and SINCs, as set out in **Section 14.8**.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		Paragraph 13.3.24 of the Scoping Opinion provides a limited summary of these assets. It is noted that table 13-2 scopes in Terrestrial Recreation, referring to the Crossness Nature Reserve under justification. However, the importance of these designations is not clearly reflected in the Significance Criteria.	Erith Marshes SINC has been incorporated within the baseline and assessed within this technical chapter. In line with the sensitivity criteria, both receptors have been given a medium sensitivity score, reflecting their classification as recreational facilities that are of regional status and/or medium visitor numbers. This chapter assesses the impacts of the Proposed Scheme on the Crossness LNR and SINCs, as set out in **Section 14.8**.
Port of London Authority			
N/A	N/A	*Noted here that the design of the scheme will be such that the existing Thames Path route will remain open where practicable and accessible to users during the construction stage, with suitable diversions identified.*	The extent of any diversion required (construction or operation phase) is not currently known. Any diversion(s) will be clearly set out and assessed within the ES, which will include a figure illustrating the diversions. The potential for PROW diversion is being explored both within the Site and outside of the Site Boundary as part of ongoing design development. Further discussions will be required with LBB, with relevant powers contained within the DCO if necessary.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		It must be made clear as the project progresses on how the Thames Path will be affected during the construction phase of the development. Further detail will also be required as part of the operational stage with regard to the access over the Thames Path for pedestrians / vehicles to the proposed jetty, as well as any pipelines which will be situated over the path, and any associated safety & security matters that will need to be considered as part of the design.	The effects on the Thames Path (England Coast Path) have been assessed in **Section 14.8**.
N/A	N/A	*During the operational phase of the development there is reference in paragraph 13.6.2 of potential additional barge moorings which should be positioned on the southern side of the River Thames and west of the proposed jetty in order to lessen the impact of regular vessel movements by the applicant's vessels and operation vessels on passing vessels. The potential impacts of these additional moorings will need to be considered in the associated NRA.*	The approach to the assessment of potential effects on these moorings has been covered within **Chapter 19: Marine Navigation (Volume 1)**. The assessment outcomes will be presented within the ES and the pNRA.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
UK Health Security Agency (UKHSA)			
N/A	N/A	*We understand that the promoter will wish to avoid unnecessary duplication and that many issues including air quality, emissions to water, waste, contaminated land etc. will be covered elsewhere in the Environmental Statement (ES). We believe the summation of relevant issues into a specific section of the report provides a focus which ensures that public health is given adequate consideration. The section should summarise key information, risk assessments, proposed mitigation measures, conclusions and residual impacts, relating to human health.* *Compliance with the requirements of National Policy Statements and relevant guidance and standards should also be highlighted.*	The potential effects on human health, and those health determinants likely to be affected by the Proposed Scheme have been outlined in **Section 14.8**. Specific human health effects have been assessed and detailed within other technical chapters such as **Chapter 5: Air Quality (Volume 1)** and the outcomes of these individual assessments have been considered to determine the overall impact on human health. Proposed mitigation measures for human health are outlines in **Section 14.9** and the residual effects are outlined in **Section 14.11**. **Table 14.1** outlines relevant guidance and standards used to inform this assessment, which includes the relevant National Policy Statement.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
N/A	N/A	*In terms of the level of detail to be included in an ES, we recognise that the differing nature of projects is such that their impacts will vary. UKHSA and OHID's predecessor organisation Public Health England produced an advice document Advice on the content of Environmental Statements accompanying an application under the NSIP Regime', setting out aspects to be addressed within the Environmental Statement. This advice document and its recommendations are still valid and should be considered when preparing an ES.* *Please note that where impacts relating to health and/or further assessments are scoped out, promoters should fully explain and justify this within the submitted documentation.*	Further engagement with UKHSA has been undertaken to agree the level of detail to be included within the PEIR and ES. UKHSA agreed to the scope and methodology for the human health, mental health and wellbeing assessment. Further details on this consultation are provided in **Table 14.3**. Public Health England's advice note has been reviewed and included as applicable guidance within **Table 14.1**.

14.3.2 **Table 14-3** provides a summary of the engagement and consultation undertaken to inform the population, health and land use assessment to date.

Table 14-3: Population, Health and Land Use Consultation and Engagement Summary

Date and Method of Consultation	Consultee	Summary of Key Topics Discussed and Key Outcomes
10th July 2023, Email	LBB	Discussion of the usage and condition of PRoW, Metropolitan Open Land (MOL) and Urban Open Space. LBB had limited information of the current usage and condition of PRoW and therefore, PRoW usage surveys will be undertaken to better inform the population, health and land use assessment to be presented in the ES. LLB has been consulted with regarding the proposed PRoW survey locations. Further information on the area of MOL and links to the Council's Green Infrastructure Study was provided.
10th August 2023, Email	UK Health Security Agency (UKHSA)	Discussion on the proposed methodology for the assessment of human health, mental health and wellbeing. UKHSA agreed to the scope and methodology for the human health, mental health and wellbeing assessment. However, it is noted that the community's understanding or perception of risk should extend beyond the use of amine-based solvents to hydrogen production, storage and transportation. However, as described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer included in the scope of the Proposed Scheme and as such this extension has not been included.

Date and Method of Consultation	Consultee	Summary of Key Topics Discussed and Key Outcomes
		The UKHSA noted that guidance on a suitable approach to the mental health assessment has been provided within their response to the Scoping Report, which has been used to inform this assessment.
22nd August 2023, Email	Thames Water Peabody LBB	Discussions with the various landowners on the proposed approach and locations of monitoring points for the PRoW usage surveys. The approach and locations were agreed by all parties.

14.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

14.4.1 The population, health and land use assessment of the Proposed Scheme has been undertaken in line with the legislation, policy and guidance described in **Section 14.2**.

POTENTIAL SIGNIFICANT EFFECTS

14.4.2 The following potential significant effects across the construction and operation phases of the Proposed Scheme have been considered in this assessment:

- Construction Phase:
  - effects on terrestrial businesses;
  - effects on businesses reliant upon access to the River Thames;
  - effects on walkers and cyclists;
  - effects on terrestrial recreation;
  - effects on recreational users of the River Thames;
  - effects on human health; and
  - effects on mental health and wellbeing.
- Operation Phase:
  - effects on businesses reliant upon access to the River Thames;
  - effects on walkers and cyclists;
  - effects on terrestrial recreation;
  - effects on recreational users of the River Thames;
  - effects on human health; and
  - effects on mental health and wellbeing.

MATTERS SCOPED OUT

14.4.3 The following effects are considered unlikely to be significant and therefore have not been considered further in this assessment:

- Operational effects on terrestrial businesses;
- Construction and operational effects on community land and assets; and
- Construction and operational effects on private property and housing.

14.4.4 As set out in **Table 14-2**, the Planning Inspectorate agrees that these effects would not likely be significant and, therefore, do not need to be considered further (see **Section 14.3** for details).

SENSITIVE RECEPTORS

14.4.5 The sensitive receptors for each of the topics scoped into the population, health and land use assessment have been set out below.

- Munster Joinery;
- Iron Mountain Records Storage Facility (data and record management);
- Asda Belvedere Distribution Centre;
- Travelodge London Belvedere;
- The Morgan (pub and restaurant);
- Lidl Warehouse/Belvedere Regional Distribution Centre;
- Tap'in 3PL Ltd (warehousing and logistics);
- Snap Fitness (gym);
- HS Carlsteel Engineering Ltd;
- Freshasia Foods Ltd;
- Intersped Logistics;
- Howdens Joinery;
- Ctr Group (recycling);
- Crossness Sewage Treatment Works;
- Ford Dagenham (car factory);
- England Coast Path;
- NCN1;
- FP1 (footpath);
- FP2;
- FP3;
- FP4;
- FP242;
- Recreational users of the River Thames;
- Erith Rowing Club;
- Erith Yacht Club;

- Thamesmead fishing mark;
- Erith Pier fishing mark;
- Crossness LNR (including both the Eastern and Stable Paddocks and the western edge of the Peabody land parcel as defined in **Figure 1-2: Satellite Imagery of the Site Boundary Plan (Volume 2)**);
- Erith Marshes SINC (including both the Eastern and Stable Paddocks and the Peabody land parcel);
- Southeast London Green Chain (including both the Eastern and Stable Paddocks and Peabody land parcel); and
- Metropolitan Open Land (including both the Eastern and Stable Paddocks and the Peabody land parcel).

BASELINE DATA COLLECTION

14.4.6 The assessment of population, health and land use is predominantly a qualitative assessment and has been informed by desk-based study and consultation with relevant authorities and stakeholders.

14.4.7 In addition to this, a survey of the usage and condition of the PRoW and usage of potential open space land within the Study Area will be undertaken to inform the ES.

14.4.8 The population, health and land use assessment has also been reliant upon site visits and surveys undertaken for other technical chapters. These include **Chapter 5: Air Quality (Volume 1), Chapter 6: Noise and Vibration (Volume 1), Chapter 7: Terrestrial Biodiversity (Volume 1), Chapter 8: Marine Biodiversity (Volume 1), Chapter 10: Townscape and Visual Impact (Volume 1), Chapter 15: Socio-economics (Volume 1), Chapter 18: Landside Transport (Volume 1)** and **Chapter 19: Marine Navigation (Volume 1)**.

ASSESSMENT METHODOLOGY

14.4.9 The assessment methodology for each of the elements scoped in has been outlined below. The assessment approach is qualitative and follows the best practice guidance set out in **Table 14-1**.

Land Use and Accessibility

Effects on Terrestrial Businesses (Construction Phase)

14.4.10 The assessment has identified the location of businesses and considers the impacts on businesses in terms of accessibility restrictions/severance. The assessment has also considered the potential loss and/or relocation of businesses.

Effects on Business which rely upon access to the River Thames (Construction and Operation Phases)

14.4.11 The assessment has identified the location of those businesses that rely upon access to the River Thames and their access requirements. The effects have been set out in terms of accessibility restrictions/severance.

Effects on Walkers and Cyclists (Construction and Operation Phases)

14.4.12 The assessment has identified likely routes taken by walkers and cyclists. At the ES stage, the frequency of use for these routes will be determined by PRoW usage and condition surveys. However, for this PEIR, frequency was determined by publicly accessible datasets and in consultation with LBB.

14.4.13 The assessment has set out the effects on walking and cycling routes according to accessibility restrictions/severance resulting in changes to journey length, perceived fear and intimidation as changes to amenity and changes to the overall experience of recreational users.

14.4.14 For the purpose of the assessment, amenity is considered to be a combination of air quality and noise levels as well as visual amenity experienced by users of walker and cyclist routes.

Effects on Terrestrial Recreation (Construction and Operation Phases)

14.4.15 The assessment has identified the location and typical level of use of terrestrial recreational assets. The effects have been set out in terms of accessibility restrictions/severance, changes to amenity and changes to the overall experience of recreational users. For the purpose of the assessment, amenity is considered to be a combination of air quality and noise levels as well as visual amenity experienced by users of walker and cyclist routes.

14.4.16 Both the Eastern and Stable Paddocks (owned by Thames Water) and the Peabody land (owned by Peabody) are grazed by horses under a licence to local traveller families.

14.4.17 At this stage, limited information is available regarding the extent of this use. Further engagement and consultation with relevant landowners and users is required to ascertain the current situation and understand fully how this land is used. Therefore the assessment of the potential effects on these graziers will be undertaken and presented within the ES.

Effects on Recreational Users of the River Thames (Construction and Operation Phases)

14.4.18 The assessment has identified the location and typical level of use of the River Thames for recreational activities. The assessment has also considered the effects of the Proposed Scheme on recreational assets that rely upon accessing the River Thames. The effects have been set out in terms of accessibility restrictions/severance and changes to the overall experience of recreational users.

Human Health

Effects on Human Health (Construction and Operation Phases)

14.4.19 There is potential for the Proposed Scheme to affect human health, with those health determinants likely to be affected by the Proposed Scheme including: air quality, noise, loss in visual amenity, opportunities for physical activity and recreation, flood risk, hazards and disasters and employment opportunities.

14.4.20 Specific human health effects have been assessed and detailed within **Chapter 5: Air Quality (Volume 1), Chapter 6: Noise and Vibration (Volume 1), Chapter 10: Townscape and Visual (Volume 1), Chapter 11: Water Environment and Flood Risk (Volume 1), Chapter 15: Socio-economics (Volume 1), Chapter 18: Landside Transport (Volume 1)** and **Chapter 20: Major Accidents and Disasters (Volume 1)**. The outcomes of these individual assessments have been considered so as to determine the overall impact on human health.

Mental Health and Wellbeing

Effects on Mental Health and Wellbeing (Construction and Operation Phases)

14.4.21 For mental health and wellbeing, a qualitative assessment has been undertaken which identified the effects during the construction and operation of the Proposed Scheme. The assessment has been informed by other aspects of the population, health and land use assessment (for example loss of recreational assets) as well as other technical chapters of the PEIR (such as **Chapter 5: Air Quality (Volume 1)**, **Chapter 6: Noise and Vibration (Volume 1)** and **Chapter 20: Major Accidents and Disasters (Volume 1**).

SIGNIFICANCE CRITERIA

Land Use and Accessibility

14.4.22 The sensitivity criteria and magnitude of impact has been assigned according to **Tables 14-4** and **14-5** for all aspects of the assessment except for human health, mental health and wellbeing which is detailed in **Table 14-6** and **Table 14-7**.

Table 14-4: Land Use and Accessibility Sensitivity Criteria

Sensitivity	Criteria
High	• Existing employment sites and land allocated for employment (e.g., strategic employment sites) covering >1 – 5ha. • Commercial or industrial buildings or land/waterways key to the operation of a business. • PRoW frequently used by walkers and cyclists for commuting, recreational and leisure purposes (e.g., National Trails). Also, for use by vulnerable travellers (e.g., elderly, school children and people with disabilities). • Terrestrial and marine recreational activities/facilities (including informal/formal green and open spaces and users of the River Thames) that are of national or international status and/or high visitor numbers.
Medium	• Existing employment sites and land allocated for employment (e.g., strategic employment sites) covering <1ha. • Commercial or industrial land/waterways not key to the commercial function of a business, for example car parking space, access and storage space. • PRoW moderately used by walkers and cyclists for commuting, recreational and leisure purposes (e.g., regional trails). • Terrestrial and marine recreational activities/facilities (including informal/formal green and open spaces and users of the River Thames) that are of regional status and or medium visitor numbers.
Low	• Proposed Scheme on unallocated sites within the Local Plan providing employment with planning permission/in the planning process. • Terrestrial and marine recreational activities/facilities (including informal/formal green and open spaces and users of the River Thames) that are of local status and/or low visitor numbers. • PRoW and other routes close to communities that are used mainly for recreational purposes (for example dog walking), but for which alternative routes can be taken.

Sensitivity	Criteria
Negligible	• No or limited severance or accessibility issues for businesses. • Areas of land or waterways which are infrequently used on a non-commercial basis. • PRoW not/infrequently used by walkers and cyclists for recreational purposes. • Terrestrial and marine recreational activities/facilities (including informal green space and users of the River Thames) that have very low visitor numbers.

Table 14-5: Land Use and Accessibility Magnitude of Impact Criteria

Magnitude of Impact	Criteria
High	• Businesses and recreation (terrestrial and marine): – Loss of resource and/or quality and integrity of resource; severe damage to key characteristics and amenity, features or elements, e.g., direct acquisition and demolition of buildings and direct development of land to accommodate the Proposed Scheme. – Introduction (adverse) or removal (beneficial) of complete severance with no/full accessibility provision. • Walkers and cyclists: – Permanent loss/severance of an existing recreational or commuting route/resource used by walkers and cyclists. – Large scale reduction (adverse) or improvement (beneficial) to amenity value and/or perceived fear and intimidation for users of the walker and cyclist route.

Magnitude of Impact	Criteria
Medium	• Businesses and recreation (terrestrial and marine): – Partial loss of/damage to key characteristics and amenity, features or elements, e.g., partial removal or substantial amendment to access or acquisition of land compromising viability of businesses, recreation asset. – Introduction (adverse) or removal (beneficial) of severe severance with limited/moderate accessibility provision. • Walkers and cyclists: – Disruption of a recreational or commuting route/resource used by walkers and cyclists with significant increase/decrease in journey length/time. – Partial loss or noticeable reduction (adverse) or partial or noticeable improvement (beneficial) in amenity value and/or perceived fear and intimidation for users of the walker and cyclist route.
Low	• Businesses and recreation (terrestrial and marine): – A discernible change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics and amenity, features or elements, e.g., amendment to access or acquisition of land/waterway resulting in changes to operating conditions that do not compromise overall viability of businesses or recreation asset. – Introduction (adverse) or removal (beneficial) of severance with adequate accessibility provision. • Walkers and cyclists: – Alteration of a recreational or commuting route/resource used by walkers and cyclists but with no significant increase in journey length/time. – Slight loss or reduction (adverse) or slight improvement (beneficial) in amenity value and/or perceived fear and intimidation for users of the walker and cyclist route.

Magnitude of Impact	Criteria
Negligible	• Businesses and recreation (terrestrial and marine): – Very minor loss or detrimental alteration to one or more characteristics and amenity, features or elements, e.g. acquisition of non-operational land or waterways/buildings not directly affecting the viability of businesses, recreation asset. – Very minor introduction (adverse) or removal (beneficial) of severance with ample accessibility provision. • Walkers and cyclists: – Very minor change to recreational or commuting route/resource used by walkers and cyclists. Very minor change in amenity value and/or perceived fear and intimidation for users of the walker and cyclist route.

14.4.23 The overall significance of effects has been determined based on the matrix shown in **Chapter 4: EIA Methodology (Volume 1)**. Effects that are classified as moderate or above are considered to be significant. Only Moderate and Major effects are significant in EIA terms.

Human Health, Mental Health and Wellbeing

14.4.24 The sensitivity criteria and magnitude of change criteria for human health, mental health and wellbeing is set out in **Table 14-6** and **Table 14-7** below.

14.4.25 The reporting of significance for human health, mental health and wellbeing differs from that outlined above. This approach follows criteria set out in the IEMA 2022 Guidance on 'Determining Significance for Human Health in Environmental Impact Assessment'[15].

Table 14-6: Human Health, Mental Health and Wellbeing Sensitivity

Sensitivity	Criteria
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".*

Table 14-7: Human Health, Mental Health and Wellbeing Magnitude of Impact

Magnitude	Criteria
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.

14.4.26 **Table 14-8** below outlines the significance matrix that has been used for assessing human health, mental health and wellbeing. Only Moderate and Major effects are significant in EIA terms.

Table 14-8: Human Health, Mental Health and Wellbeing Sensitivity

		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

14.5. STUDY AREA

14.5.1 The Study Area for population, health and land use is detailed below for each element of the assessment. It should be noted that 'population' does not have its own specific Study Area, as this chapter assesses the potential impacts on the population through effects associated with land use, accessibility, recreation and human health.

14.5.2 The Study Areas have been defined using the Design Manual for Roads and Bridges (DMRB) guidance Volume 11, Section 3, Part 6, LA112 Population and Human Health[18], where appropriate.

14.5.3 The relevant Study Areas outlined below are shown on **Figure 14-1: Population, Health and Land Use Study Areas (Volume 2)**.

LAND USE AND ACCESSIBILITY

Terrestrial Businesses

14.5.4 Those businesses within 100m of the Site Boundary, or those which have a direct means of access within the Site.

Business which rely upon access to the River Thames

14.5.5 The stretch of River Thames within the Site as well as any area that extends beyond the Site where changes to navigation and surface water features could affect business operations (see **Chapter 11: Water Environment and Flood Risk (Volume 1)** for further details).

Walkers And Cyclists

14.5.6 Those PRoW located within the Site as well as those located within a 500m Study Area around the Site Boundary have been used for the assessment of change in accessibility and amenity value of PRoW and routes used by walkers and cyclists.

Terrestrial Recreation

14.5.7 Recreational facilities located within 500m of the Site Boundary, or those which have a direct means of access within the Site.

Recreational Users of the River Thames

14.5.8 The stretch of River Thames within the Site as well as any area that extends beyond the Site Boundary where changes to navigation and surface water features could affect recreational users (see **Chapter 11: Water Environment and Flood Risk (Volume 1)** for further details).

HUMAN HEALTH, MENTAL HEALTH AND WELLBEING

14.5.9 For the human health, mental health and wellbeing assessments, the Study Area has been determined by the extent and characteristics of the Proposed Scheme, and the communities directly and indirectly affected by the Proposed Scheme. The smallest jurisdiction boundaries for the Proposed Scheme are Lower Layer Super Output Areas (LSOA) which lie within or adjacent to the Site Boundary.

14.5.10 Where possible, they form the basis of the Study Area for health because they are the communities that are most likely to experience direct and/or the greatest impacts. Where data is unavailable at an LSOA level, ward level data has been used.

14.5.11 The various geographical area profiles are as follows:

- **National:** England.
- **Regional:** Greater London.
- **Borough:** LBB.
- **Wards:** Belvedere, Erith, Thamesmead East, Northumberland Heath, and Lesnes Abbey.
- **LSOA:** Bexley 001A, Bexley 003B, Bexley 004D, and Bexley 002E.

14.5.12 The potential health impacts are likely to be direct and/or greatest in the communities surrounding the Site. While the Proposed Scheme has the potential to impact on the population outside of the area directly affected, these effects will be less than those effects felt by the local community.

14.6. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

14.6.1 The key sources of information used for the baseline review for population, health and land use are:

- Fingertips Public Health Data[21];
- English Indices of Multiple Deprivation[22];
- LBB Joint Strategic Needs Assessment[23];
- London Datastore, London Area Profiles[24];
- Official Census and Labour Market Statistics (NOMIS)[25];
- MMO Marine Activity Data[26]; and
- any relevant websites for recreational groups, facilities and activities.

14.6.2 A short summary of the baseline conditions is presented below. Recreational activities can be an attraction for tourists and, therefore, the England Coast Path, NCN1, FP1, FP2, FP3, FP4 and FP242, recreational activities along the River Thames and terrestrial recreation (such as Crossness LNR) are also considered to be tourism receptors. Other receptors are not considered to be tourist receptors.

Population

14.6.3 The Proposed Scheme is located within the LBB. According to NOMIS data, the total population of the Borough in 2021 was 246,500. **Table 14-9** below shows the population breakdown within the LBB in 2021.

Table 14-9: Population breakdown of the LBB, Greater London and England[25]

Age Group (years)	LBB (%)	Greater London (%)	England (%)
Under 16	20.5	19.3	18.6
16-24	10	11.1	10.6
25-64	52.9	57.8	52.4
65-84	14.2	10.3	16
85+	2.4	1.6	2.4

14.6.4 As shown in **Table 14-9**, the working age population for LBB is lower than the Greater London average and the same as the national average, with 62.9% of residents aged between 16-64, compared to 68.9% in Greater London and 63% in England.

14.6.5 According to data from London Area Profiles (2018)[24], the population in the LBB is slightly younger than the national average, with 16.4% of the population aged over 65, compared to 18.2% in England. This is, however, higher than the Greater London average of 11.7%[24].

14.6.6 Of the 317 local authorities in England, Bexley is ranked 190th in terms of overall deprivation, where a rank of one is the most deprived and a rank of 317 is the least deprived[22]. There are some smaller pockets of deprivation within the Borough and the Proposed Scheme is located in the top 30% of most deprived neighbourhoods nationally in terms of overall deprivation[22].

14.6.7 The proportion of people aged between 16-64 in Bexley with no academic qualifications is higher than the national (6.6%) and regional (5.5%) averages at 7.4%[25]. Those people achieving degree level qualifications (NVQ4 and above) in Bexley (42.4%) is somewhat lower than the regional average (59.0%), but similar to the national average (43.6%)[25]. Overall, this suggests a slightly lower skilled workforce within the LBB compared with the Greater London region.

Gypsies, Travellers and Showpeople

14.6.8 At the time of the 2011 Census (which represents the most recent dataset), LBB had the 7th highest gypsy or traveller population of all local authorities in England, representing 1.1% of the total population in Bexley[27].

14.6.9 Of these, six households lived in a caravan or other mobile or temporary structure and 198 households lived in bricks and mortar (house, bungalow, flat, maisonette or apartment). There is one authorised, permanent, Council-owned gypsy and traveller site in the borough located at Jenningtree Way approximately 610m east of the Site Boundary[28].

14.6.10 Both the Eastern and Stable Paddocks (owned by Thames Water) and the Peabody land (owned by Peabody) are located within the Site and have been grazed by horses under a licence to local traveller families; the current situation is being confirmed with the relevant landowners.

Businesses

Terrestrial

14.6.11 Opportunity Areas are identified in the London Plan[4] as significant locations with development opportunities to accommodate new homes, jobs and infrastructure of all types. They are linked to existing of potential improvements to public transport and typically have capacity for at least 5,000 new jobs or 2,500 new homes, or a combination of the two.

14.6.12 The Proposed Scheme is located within the Bexley Riverside Opportunity Area[5]. This area has been identified in the London Plan[29] since 2004 with the potential provision for 6,000 new homes and 19,000 new jobs by 2041.

14.6.13 The detailed boundary of the Opportunity Area has not been defined at the time of writing. However, it is considered likely to fall within the Study Area as detailed in the London Plan 2021[4] (paragraph 2.1.55), where the Bexley Riverside Opportunity Area would stretch along the south side of the Thames and include the area of Belvedere. The Bexley Growth Strategy[8] shows that part of the Opportunity Area in Belvedere is located within the Site.

14.6.14 Immediately south of the South Boundary is the Thamesmead and Abbey Wood Opportunity Area, the boundary of which has been defined. This area has the potential for 8,000 new homes and 4,000 new jobs by 2041[4].

14.6.15 There are number of terrestrial businesses that rely upon access to the River Thames for the transportation of materials and goods, some of which require the use of jetties, such as the Thames Water Jetty (Thames Water), Ford Dagenham Terminal (Ford Motor Company) and Thunderer Jetty (multiple businesses). See **Figure 19-1: Marine Navigation Study Area with Key Navigational Features (Volume 2)** for further details.

14.6.16 The Proposed Scheme is located within the Belvedere Industrial Area, a designated Strategic Industrial Location (SIL) by both the London Plan[4] and the Bexley Local Plan[5]. Hailey Road Industrial Estate, also a designated SIL, is located approximately 60m south of the Site Boundary. The London Plan (policy E5) states these sites are important locations that should be *"managed proactively [..] to sustain them as London's largest concentrations of industrial, logistics and related capacity for uses that support the functioning of London's economy"*[4].

14.6.17 The Belvedere Industrial Area hosts businesses predominantly associated with manufacturing and logistics. Larger units include Iron Mountain Records Storage Facility, Asda Belvedere Distribution Centre, Amazon UK DBR1 and Lidl Warehouse/Belvedere Regional Distribution Centre.

14.6.18 The businesses operating within the Site Boundary include Riverside 1 (the Applicant) and Munster Joinery. At the time of writing construction works for Riverside 2 are being undertaken. Munster Joinery is located on the western side of Norman Road, the main access to the Proposed Scheme, as shown in **Figure 1-2: Satellite Imagery of the Site Boundary Plan** (**Volume 2**) and **Figure 14-2: Terrestrial Businesses (Volume 2)**. Further information on the business operations at the Munster Joinery is provided in **Section 15.6** of **Chapter 15: Socio-economics (Volume 1)**.

14.6.19 There are 12 other businesses located within the Study Area (100m from the Site Boundary):

- Iron Mountain Records Storage Facility – adjacent (east);
- Asda Belvedere Distribution Centre – adjacent (east);
- Lidl Warehouse/Belvedere Regional Distribution Centre – adjacent (southeast);
- Ctr Group – approximately 80m south;
- Howdens Joinery– approximately 90m south;
- Tap'in 3PL Ltd – approximately 95m south;
- The Morgan Pub and Restaurant – approximately 35m south;
- Travelodge London Belvedere – approximately 55m east;
- Snap Fitness – approximately 90m east;
- HS Carlsteel Engineering Ltd – approximately 95m south;
- Freshasia Foods Ltd. – approximately 100m south; and
- Intersped Logistics (UK) Limited - approximately 90m south.

14.6.20 **Figure 14-2: Terrestrial Businesses** (**Volume 2)** sets out the location of these businesses within the Study Area.

Marine

14.6.21 There are two jetties located within the Site; Belvedere Power Station Jetty (currently unused and in disrepair) and Middleton Jetty, which is currently operated as part of Riverside 1 and which will also be used for Riverside 2. Further upstream (approximately 500m), the Thames Water Jetty serves as an operational base for the vessels Thames Bubbler and Thames Vitality that are used to inject oxygen into the River Thames[30]. Further details about these jetties can be found in **Chapter 19: Marine Navigation (Volume 1)**.

14.6.22 Sightseeing and pleasure boat tours use the River Thames. The closest points of the boat routes are distant from the Site Boundary, at approximately 2.5km west and 11.5km southwest respectively. It is understood that neither of the boat routes use the section of the River Thames within the Site.

14.6.23 The Ford Dagenham factory lies approximately 350m north of the Site Boundary on the northern bank of the River Thames. Vessels using the dedicated roll on–roll off berth regularly enter the Site when manoeuvring.

Walkers and Cyclists (as well as tourism)

14.6.24 Approximately 960m of the south east section of the England Coast Path (FP3/NCN1) intersects the Site Boundary, which follows the banks of the River Thames. This path is classed as a National Trail and extends from Woolwich in the west to Grain in Kent in the east.

14.6.25 The England Coast Path (FP3/NCN1) also provides a link to the Thames Path creating a continuous ‘Source to Sea’ National Trail along the length of the River Thames from the Cotswolds to the North Sea. The entire ‘Source to Sea’ trail is 374 km following the south bank of the River Thames in London. Both routes are of national significance[31].

14.6.26 In addition, there are three PRoW located within the Site: FP2; FP3; and FP4. There are two further PRoW located within the wider area: FP1, located approximately 40m west of the Site Boundary, within the Crossness LNR; and FP242, located immediately adjacent to the Site Boundary (south) connecting directly to the England Coast Path (FP3/NCN1) and Crabtree Manorway North[32].

14.6.27 **Figure 14-3: Public Rights of Way and Areas for Recreation (Volume 2)** sets out the location of these receptors within the Study Area.

Recreation and Tourism

Terrestrial

14.6.28 The Bexley Green Infrastructure Study[33] classifies the open space including the Crossness LNR and Peabody land as 'higher quality/higher value', however it is recognised there are some areas with restricted access. These 'higher quality/higher value' sites are considered to be the best open spaces within the borough offering the greatest value and quality for the surrounding communities.

14.6.29 This area of land is also designated within the Bexley Local Plan[5] as Erith Marshes SINC. The Crossness LNR and SINC are designated not only for their significance for wildlife, but also for their value to people. Access to nature has significant health and wellbeing benefits by allowing people to connect with nature.

14.6.30 The Southeast London Green Chain runs through the Site. It "*forms part of a virtually continuous arc of public and private open spaces, largely in recreational use, which extends through the London boroughs of Bexley, Bromley, Lewisham and Royal Greenwich*"[35].

14.6.31 Crossness LNR comprises some 25 ha of land, comprising publicly accessible, Members only and restricted access areas. The Eastern and Stable Paddocks (within the Site) are gated and not publicly accessible. Membership as a Friend of Crossness Nature Reserve provides access to the 'Protected Area' including the bird hide, to volunteering activities and to special events such as pond dipping, bat walks, butterfly walks, birdsong walks and wildflower walks[34]. The Crossness LNR is crossed by the Thames Water Access Road and PRoW FP2 and FP4, leading to the Thames Path and Southmere Park respectively. Views across much of the Crossness LNR, including access restricted areas that are fenced for birds, are available from these PRoW.

14.6.32 The Carbon Capture Facility and Mitigation Area of the Proposed Scheme, comprising the Peabody land parcel and the Eastern and Stable Paddocks, are situated within MOL, designated as 'strategic open land within the urban area'[4]. The MOL within the Eastern and Stable Paddocks is not currently accessible to the public.

14.6.33 The MOL designation extends south of the Site Boundary (south of Eastern Way) and east (towards Thamesmead) and includes informal routes and footpaths that are used for informal recreation.

14.6.34 Surveys are being undertaken to understand the usage of FP2 and whether users of this route regularly divert off the path onto the surrounding land. This is to determine whether the land is classified as public open space for the purposes of the Acquisition of Land Act 1981.

14.6.35 There is an area of Urban Open Space (Belvedere Ditches and Dykes) located on Norman Road, within the Site. Urban Open Spaces are defined in the Bexley Local Plan[5] (specifically Policy SP8) as land use designations that *"by virtue of its openness, is important to health and wellbeing, and visual amenity, through its contribution to the wider landscape and/or in providing attractive breaks in the built-up area"*. Although, this narrow area of land breaks up the urban landscape within Belvedere, as it is predominantly a ditch, it doesn't provide any recreational value.

Marine

14.6.36 Erith Rowing Club is the nearest recreational club that relies upon access to the River Thames, located approximately 2.6km downstream from the Proposed Scheme. Approximately 1.5km south east is the Erith River Wharf Visitor Mooring with space for two vessels. The Erith Yacht Club is located approximately 4km downstream and uses the River Thames (including the area within the Site) for sailing events. It is also understood that the Greenwich Yacht Club uses this stretch of the River Thames for sailing events.

14.6.37 The River Thames also provides angling opportunities. There are fishing marks at Thamesmead (approximately 2.5km west of the Site Boundary) and Erith Pier (approximately 3.2km southeast of the Site Boundary) and it is possible to fish directly from the river wall, including areas which fall within the Site.

14.6.38 According to MMO Marine Activity Data[26] models for recreational activity, there are medium to medium high levels of personal watercraft use, sailing and motorboat use and low levels of angling along the River Thames within the Study Area.

Human Health, Mental Health and Wellbeing

14.6.39 Life expectancy within Bexley is 79.5 years for males and 83.5 years for females, similar to figures in Greater London (79.0 years for males and 83.5 years for females) and broadly in line with figures in England (78.7 years for males and 82.6 years for females)[35].

14.6.40 The health of people in the LBB varies in comparison with the England average. The Public Health England local authority profile for LBB[35] indicates that certain health indicators, such as 'diabetes diagnosis', 'smoking prevalence in adults (18+)' and the 'percentage of adults (18+) classed as overweight or obese' are similar to the national average. However, 'under 75 mortality from all causes' and the 'percentage of children in low income families' indicators are both significantly better than the national average.

14.6.41 General health within LBB is slightly better than both Greater London and England, with 48.5% of residents in very good health, 33.7% in good health, 12.7% in fair health, 4% in bad health, and 1.2% in very bad health[25].

14.6.42 Of the residents within the borough, 17.3% are disabled, of which 7.3% have their day-to-day activities limited a lot. An additional 6.8% of residents have a long term physical or mental health condition but are not disabled nor are day-to-day activities limited[25].

14.6.43 Poor levels of physical activity are seen within LBB, with only 63.7% of adults completing the recommended activity levels. This is lower than the Greater London and England averages (66.8% and 67.3% respectively)[36].

14.6.44 There are lower rates of common mental health disorders within LBB compared to Greater London and England averages. It is estimated that 16% of the population aged 16 and over within the borough have common mental health disorders. This is lower than the Greater London average of 19.3% and slightly lower than the England average of 16.9%. Similarly, the prevalence of common mental health disorders in those aged over 65 years in LBB is 9.6%, which is lower than the Greater London average of 11.3% and slightly lower than the England average of 10.2%[35].

14.6.45 The percentage of people with high anxiety in the LBB is 20.2%, which is lower than the Greater London value of 23.8% and the England value of 22.6%[35].

14.6.46 In LBB, 13.4% of residents report low happiness, compared to just 8.7% in Greater London and 8.4% in England. The self-reported scores for low level of self-worth and low satisfaction are also higher in LBB than Greater London and England. In LBB, 4.4% of residents report having a low sense of self-worth, compared to 3.4% in Greater London and 4% in England. Similarly, 6.1% of LBB residents report low satisfaction, compared to 4.6% in Greater London and 5% in England[35].

14.6.47 The suicide rate in LBB is 7.2 per 100,000 residents. This is lower than the England average of 10.4 per 100,000[37].

14.6.48 Evidence shows that people are happier when they are in green or blue spaces[a,38]. 32% of the LBB surface area has green space. This is 1% higher than the Greater London average. However, within the LBB, 40% of households have deficient access to nature[2336].

14.6.49 According to Age UK, generally there are medium, high, and very high risk of loneliness across LBB[39] for those aged 65+. Within the Belvedere, Erith, Thamesmead East and Lesnes Abbey wards these levels are also medium, high and very high. The LSOA of Bexley 002E is at very high risk of loneliness for those aged 65+, while Bexley 003B and Bexley 004D are at medium risk of loneliness, and Bexley 001A is at high risk of loneliness.

[a] Blue spaces comprise all the areas dominated by surface waterbodies or watercourses, whilst green space includes onshore areas set apart for recreational or aesthetic purposes in an otherwise urban environment such as parks, gardens, woodlands etc. In terms of health and wellbeing, access to these spaces can have significant effect on physical and mental health and wellbeing.

FUTURE BASELINE

14.6.50 Existing commercial business within the Site would remain at their current locations should the Proposed Scheme not proceed. These include Riverside 1, including Middleton Jetty, and the Munster Joinery. Riverside 2 would also be operational in the future baseline.

14.6.51 The population in Bexley is anticipated to grow by 3.9% over the next 10 years (2023-2033)[24]. It is also anticipated that the age distribution and structure will also change over time, with a particular increase in the over 65s This growth is likely to put strain on existing services and require additional housing, facilities, services and infrastructure to accommodate the growth.

14.6.52 Despite the population growth and changes in demographic, these changes are unlikely to change the assessment outcome.

14.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

14.7.1 This section sets out the embedded design, mitigation and enhancement measures which are relevant to the population, health and land use assessment.

CONSTRUCTION PHASE

- With the exception of Munster Joinery, access to terrestrial businesses would be maintained throughout the construction period.
- Access to the River Thames for recreational users will be maintained throughout the construction period.
- The Proposed Jetty has been positioned within the channel such that a minimal volume of dredging is required, whilst ensuring safe navigation for Proposed Scheme vessels berthing at the Proposed Jetty, and third party vessels transiting along the navigation channel.
- Middleton Jetty would continue to operate as usual to enable the continued operation of Riverside 1 and Riverside 2.
- A safety vessel will be present when construction activities for the Proposed Jetty are underway.
- Where appropriate, there will be a preference for the material required for the construction of the Proposed Jetty to be transported via the River Thames.
- The transport of construction plant and materials for the landside elements of the Proposed Scheme will primarily be by road.
- Temporary construction compound(s) will be located in the Munster Joinery, Borax South and the northern half of the Gannon land parcels. Once construction is complete the temporary construction compound(s) will be utilised as part of the Proposed Scheme.

14.7.2 Once construction is complete, the Munster Joinery land parcel will be utilised as part of the Carbon Capture and Storage Facility. The demolition and relocation of the Munster Joinery is therefore required; however, the Applicant intends to work with the business to seek to find a replacement site. The demolition of Munster Joinery would represent a worst-case scenario.

- The environmental mitigation required during construction will be recorded in the OCoCP, which will be submitted as part of the application for development consent.
- A Framework Construction Traffic Management Plan will be prepared and submitted as part of the application for development consent.
- The design will ensure that routes used by walkers and cyclists (including PRoW, long distance walking routes and NCN routes) will, where practicable, remain open and accessible to users during construction. Where this is not practicable, suitable diversions will be identified.
- Mitigation measures from **Chapter 5: Air Quality (Volume 1)**; **Chapter 6: Noise and Vibration (Volume 1)**; **Chapter 10: Townscape and Visual (Volume 1)**, **Chapter 11: Water Environment and Flood Risk (Volume 1)**; **Chapter 15: Socio-economics (Volume 1)**; **Chapter 18: Landside Transport (Volume 1);** and **Chapter 20: Major Accidents and Disasters (Volume 1)** are relevant to population, health and land use and will be incorporated into the OCoCP.

OPERATION PHASE

- Based on a preliminary operational capacity assessment, up to five marine vessels will call at the Proposed Jetty each week to collect and transport LCO_2 to meet the annual throughput.
- The Proposed Scheme is expected to be operational 24 hours per day and 365 days per year. The Proposed Scheme will operate concurrently with Riverside 1 and Riverside 2 (once operational).
- Procedures for the maintenance of the Mitigation Area will be set out in an OLEMP (or similar type document as the Applicant is continuing to develop its thinking on these areas) that will be submitted with the application for development consent. The Proposed Scheme will generate a small number of vehicle movements during the operational phase, as stated in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.
- An Outline Emergency Preparedness and Response Plan (OEPRP) will be prepared and submitted alongside the application for development consent.
- Should PRoW require permanent diversion, suitable routes will be identified and agreed with LBB and affected third party land owners.
- The OEMP (prepared prior to the Proposed Scheme becoming operational) will ensure that adverse effects are avoided/reduced where practicable. This will be secured via a requirement in the DCO.

- Mitigation measures from **Chapter 5: Air Quality (Volume 1)**; **Chapter 6: Noise and Vibration (Volume 1)**; **Chapter 10: Townscape and Visual (Volume 1)**, **Chapter 11: Water Environment and Flood Risk (Volume 1)**; **Chapter 15: Socio-economics (Volume 1)**; **Chapter 18: Landside Transport (Volume 1);** and **Chapter 20: Major Accidents and Disasters (Volume 1)** are relevant to population, health and land use.

14.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

14.8.1 This section details the preliminary assessment of impacts and effects for the Proposed Scheme during both the construction and operational phases, taking into account the embedded design, mitigation and enhancement measures detailed in **Section 14.7**.

14.8.2 The demolition or retention of the Belvedere Power Station Jetty (disused) will not change the outcomes of the preliminary assessment of impacts and effects reported within this technical chapter. This is because the anticipated change to the effects on the sensitive receptors as a result of the demolition or retention of the Belvedere Power Station Jetty (disused) would not be large enough to change the outcomes or significance of the assessment, although this will be assessed and confirmed in the ES.

SENSITIVE RECEPTORS

14.8.3 **Table 14-10** below outlines the sensitive receptors that have been assessed. The sensitivity of these have been determined using the sensitivity criteria set out in **Table 14-5**.

Table 14-10: Sensitive Receptors

Topic	Sensitive Receptors
Terrestrial Businesses	• Munster Joinery (high) • Iron Mountain (high) • Asda Belvedere Distribution Centre (high) • Travelodge London Belvedere (medium) • The Morgan (medium) • Lidl Belvedere Regional Distribution Centre (high) • Tap'in 3PL Ltd (medium) • Howden's (medium) • Ctr Group (medium) • Snap Fitness (medium) • HS Carlsteel Engineering Ltd (medium) • Freshasia Foods Ltd. (medium) • Intersped Logistics (medium)

Topic	Sensitive Receptors
Business that rely upon access to the River Thames	• Crossness Sewage Treatment Works (High) • Ford Dagenham (High)
Walkers and Cyclists	• England Coast Path (high) • NCN1 (high) • FP1 (medium) • FP2 (medium) • FP3 (medium) • FP4 (medium) • FP242 (medium)
Terrestrial Recreation	• Crossness LNR (including the Eastern and Stable Paddocks and Peabody land parcels) (medium) • Erith Marshes SINC (medium) • Southeast London Green Chain (medium) • MOL (medium)
Recreational users of the River Thames	• Recreational users of the River Thames (medium) • Recreational facilities: – Erith Rowing Club (medium) – Erith Yacht Club (medium) – Thamesmead fishing mark (low) – Erith Pier fishing mark (low)
Human Health, Mental Health and Wellbeing	For human health the local population is deemed to be the sensitive receptor, rather than individuals. This is in line with IEMA's Guidance on 'Determining Significance for Human Health in Environmental Impact Assessment[b]. The overall sensitivity is considered to be medium. This is because the overall health of the local population around the Proposed Scheme is deemed to generally be in line with the national average, albeit that there are some areas of deprivation.

[b] The guidance states that *"EIA analysis at the level of individuals would likely mean that all determinants of health conclusions, positive or negative, would be significant on all projects because of the effects to some particularly sensitive individuals. This would be contrary to supporting decision-makers in identifying the material issues. Assessment of EIA significance at the level of individuals is not proportionate."*

CONSTRUCTION PHASE

Effects on Terrestrial Businesses

14.8.4 As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, Munster Joinery would be demolished, and the site used as a temporary construction compound for the landside elements of the Proposed Scheme and then as part of the Carbon Capture Facility. The Applicant will seek to relocate Munster Joinery to a suitable alternative location. However, as the relocation site has not been identified or secured at the time of writing, the loss of Munster Joinery has been considered within the assessment as a worst-case scenario and as a long term permanent construction effect.

14.8.5 For the assessment of effects on terrestrial businesses, the sensitivity of Munster Joinery is high. The magnitude of change is high because it has been assessed that Munster Joinery would be lost as a worst-case scenario. Therefore, there is likely to be a direct, permanent, long term, **major adverse effect (significant)** on Munster Joinery.

14.8.6 There is potential for those businesses located within the 100m Study Area (as detailed in **Table 14-11** below) to be adversely affected by increased construction traffic movements on Yarnton Way, Eastern Way (A2016) and Norman Road. As reported in **Chapter 18: Landside Transport (Volume 1**) it is anticipated that as a worst-case scenario for peak daily construction traffic (two-way) there will be a total of 1,730 additional trips on Norman Way (59.2% traffic increase), 213 additional trips on Eastern Way (0.9% traffic increase) and 115 additional trips on Yarnton Way (1.0%).

14.8.7 However, as these businesses are located within an existing industrial area where movements of light and HGVs are common; consequently, movements are considered to have a low magnitude of change. For this reason, the magnitude of change is considered to be low.

14.8.8 As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, two options for the construction programme are being considered as part of ongoing design development: Option 1 and Option 2. The estimated construction period is approximately 60 months (five years) for Option 1 and approximately 45 months (four years) for Option 2. The construction work is not permanent and therefore the effects from associated HGV movements will be temporary and short-term in nature.

14.8.9 The effects on the remaining terrestrial businesses within the Study Area are recorded in **Table 14-11** below. As defined in **Table 14-5**, the sensitivity of these businesses are deemed to be either high or medium depending upon their size – High >1ha in size, medium <1ha in size.

Table 14-11: Construction Effects on Terrestrial Businesses

Receptor	Direct/ Indirect	Permanence/ Duration	Sensitivity	Magnitude	Significance of Effects
Iron Mountain Records Storage Facility	Indirect	Temporary, short term	High	Low	**Moderate adverse (significant)**
Asda Belvedere Distribution Centre	Indirect	Temporary, short term	High	Low	**Moderate adverse (significant)**
Travelodge London Belvedere	Indirect	Temporary, short term	Medium	Low	**Minor adverse (not significant)**
Snap Fitness	Indirect	Temporary, short term	Medium	Low	**Minor adverse (not significant)**
The Morgan	Indirect	Temporary, short term	Medium	Low	**Minor adverse (not significant)**
Lidl Belvedere Regional Distribution Centre	Indirect	Temporary, short term	High	Low	**Moderate adverse (significant)**
Tap'in 3PL Ltd	Indirect	Temporary, short term	Medium	Low	**Minor adverse (not significant)**
HS Carlsteel Engineering Ltd	Indirect	Temporary, short term	Medium	Low	**Minor adverse (not significant)**
Freshasia Foods Ltd.	Indirect	Temporary, short term	Medium	Low	**Minor adverse (not significant)**

Receptor	Direct/ Indirect	Permanence/ Duration	Sensitivity	Magnitude	Significance of Effects
Intersped Logistics (UK) Limited	Indirect	Temporary, short term	Medium	Low	**Minor adverse (not significant)**
Howdens	Indirect	Temporary, short term	Medium	Low	**Minor adverse (not significant)**
Ctr Group	Indirect	Temporary, short term	Medium	Low	**Minor adverse (not significant)**

Effects on Businesses Reliant upon Access to the River Thames

14.8.10 Both Ford Dagenham and Thames Water (Crossness Sewage Treatment Works) require access to their purpose-built jetties as part of their operations; notwithstanding that the Thames Water Jetty is used less frequently (approximately once a week), see **Chapter 19: Marine Navigation (Volume 1).** Access to these terminals has the potential to be affected by increased vessel movements associated with the construction of the Proposed Jetty. However, access will be maintained throughout construction period through to reduce the impact of regular vessel movements associated with Riverside 1, Riverside 2 and the Proposed Scheme on passing vessels.

14.8.11 Works on the Proposed Jetty and the movements of barges delivering materials and components to the construction site is not anticipated to go beyond the authorised channel and therefore access to the Ford terminal will remain unaffected, with disruption (due to increased vessel movements) limited. Although located in the same southern, authorised channel as the Proposed Scheme, the infrequent use of the Thames Water Jetty and embedded mitigation means the Thames Water Jetty would remain largely unaffected. Therefore, the construction of the Proposed Scheme is not anticipated to affect the viability of either business. Further details are provided in **Chapter 19: Marine Navigation (Volume 1)**.

14.8.12 For the assessment of effects on those businesses that rely upon access to the River Thames, the sensitivity of both Ford Dagenham and Crossness Sewage Treatment Works is high. Access for vessels will be maintained throughout the construction period and disruption from vessel movements would be limited; the magnitude of change is therefore negligible. Therefore, there is likely to be a direct, temporary, short term, **negligible (not significant)** effect for both Ford Dagenham and Crossness Sewage Treatment Works.

Effects on Walkers and Cyclists

14.8.13 Walkers and cyclists using routes and traversing the Crossness LNR and MOL within the Site and 500m Study Area have the potential to be adversely affected by the construction of the Proposed Scheme through temporary or permanent PRoW diversions as well as potential loss in amenity from increases in noise and air pollution, and changes in views. Users of walking and cycling provision adjacent to roads could also experience fear and intimidation from construction traffic. These affects are anticipated to be temporary and short term and as stated in **Chapter 18: Landside Transport (Volume 1)** there will unlikely be any change in level of fear and intimidation already experienced.

14.8.14 FP2 is located within the Site. For the purpose of this assessment, it is assumed that FP2 would need to be permanently diverted as a result of the construction activities and for the operational requirements of the Carbon Capture Facility and this permanent diversion would be implemented during the construction phase. At this stage, the diversion route is not known, however, the area to the west of the Site Boundary is being explored as part of ongoing design development and there is potential for this to result in an increase in journey time. This would, in particular, effect those using FP2 to access Crossness LNR from Norman Road, which provides on street parking for users. For the purposes of this assessment, it has been assumed that the permanent diversion would cause an increase in journey length, as a worst-case scenario.

14.8.15 FP4 is located within the Site and provides a link between the England Coast Path and Norman Road. During construction, a number of pipelines are likely to be constructed along the eastern side of the Site Boundary, on an above ground pipe rack, which will connect to the Proposed Jetty. A construction method statement and risk assessment would need to be undertaken to determine if FP4 would need to be temporarily closed for any specific elements of the construction activities e.g., where steelwork or pipework may be required to be craned into position, there may be a potential risk to the public from a dropped load. Further clarity on the potential closure of this route will be provided within the ES. For the purposes of this assessment, it has been assumed that FP4 would need to be temporarily diverted and this would cause an increase in journey length, as a worst-case scenario. Works could also adversely affect users of the FP4 from increases in noise and air pollution, change in views and potential fear and intimidation.

14.8.16 The connection to the Proposed Jetty will also cross over, in the air space, FP3, NCN1 and the England Coast Path, but which may require these routes to be diverted.

14.8.17 The construction of the Proposed Scheme will lead to changes in amenity experienced by users of these walker and cyclist routes. For example, the construction works could lead to increased noise levels, dust generation and changes to views from walker and cyclist routes. The assessment has therefore considered the assessment findings of **Chapter 5: Air Quality (Volume 1), Chapter 6: Noise and Vibration (Volume 1)** and **Chapter 10: Townscape and Visual (Volume 1)**. However, the assessment on amenity covers the overall change in the walkers and cyclists' experience of the route The effects on each of the PRoW has been recorded in **Table 14-12** below. This identifies significant adverse effects for the England Coast Path, FP3, NCN1, FP2, and FP4.

14.8.18 It should be noted that a PRoW usage and condition survey will be undertaken which will inform the assessment presented the ES. This could result in a change in the recorded sensitivity and subsequently could result in changes to the effects identified in **Table 14-12** below. PRoW diversions will also be known and will be assessed as part of the ES.

Table 14-12: Construction Effects on Walking and Cycling Routes

Receptor	Direct / Indirect	Permeance/ Duration	Sensitivity	Magnitude	Significance of Effects
England Coast Path	Direct	Temporary, short term	High	Medium	**Moderate adverse (significant)**
NCN1	Direct	Temporary, short term	High	Medium	**Moderate adverse (significant)**
FP1	Indirect	Temporary, short term	Medium	Low	**Minor adverse (not significant)**
FP2	Direct	Temporary, short term	Medium	Medium	**Moderate adverse (significant)**
FP3	Direct	Temporary, short term	Medium	Medium	**Moderate adverse (significant)**
FP4	Direct	Temporary, short term	Medium	Medium	**Moderate adverse (significant)**
FP242	Indirect	Temporary, short term	Medium	Low	**Minor adverse (not significant)**

Effects on Terrestrial Recreation

14.8.19 The Proposed Scheme is partially located within the Crossness LNR and Erith Marshes SINC. Part of both of these sites will be required for construction and operation of the Carbon Capture Facility whilst a proportion of the western side of the Crossness LNR may also form part of the Mitigation Area.

14.8.20 There is potential for disruption to access, loss of amenity and permanent change to the Crossness LNR and Erith Marshes SINC. The permanent loss of part of Crossness LNR and Erith Marshes SINC has been assessed as a long-term permanent construction impact. As identified within **Chapter 7: Terrestrial Biodiversity (Volume 1)**, losses within the boundary of the LNR itself are focussed on the Eastern and Stable Paddocks, which are used for horse grazing with a limited number of bird habitats. However, the location of development closer to the bird watching areas of the Crossness LNR (which would remain open) will give a backdrop of industrial machinery. This may deter some bird populations and reduce overall levels of tranquillity and enjoyment of the site.

14.8.21 It is understood that users of the LNR use Norman Road for parking, on an informal basis. The public highway is located within the Site and will provide access to the Proposed Scheme. Increases in construction traffic and HGV movements could restrict parking along Norman Road, which could limit access for users (particularly those with reduced mobility) of the Crossness LNR. In addition, FP2 provides access to the Crossness LNR and may need to be diverted as detailed in **Paragraph 14.8.14**

14.8.22 It is anticipated that Crossness LNR will remain open during construction of the Proposed Scheme, with the exception of the Eastern and Stable Paddocks that lie within the Site Boundary. The full extent and purpose of the Mitigation Area is the subject of ongoing design development, and this position will be reviewed in the ES, however, as a small area of the Crossness LNR forms part of the Mitigation Area, this area may be temporarily closed to the public during construction. The intention is that once operational, portions of this area will be once again open to the public, however, the extent of this is the subject of ongoing design development and it is anticipated that some portions will be permanently lost.

14.8.23 For the assessment of effects on terrestrial recreation, the sensitivity of Crossness LNR and Erith Marshes SINC is medium as they provide a regionally important area for recreation and tourism. The magnitude of change for those areas of the LNR and Erith Marshes SINC that will be lost is medium. Therefore, there is likely to be a direct, permanent, long term, **moderate adverse (significant)** effect on Crossness LNR and Erith Marshes SINC.

14.8.24 For those areas of Crossness LNR and Erith Marshes SINC that will remain open and accessible during construction, the magnitude of change is deemed to be low due changes in amenity which may inhibit bird watchers as well as potential reduced access to Crossness LNR. Therefore, there is likely to be a direct, temporary, short term, **minor adverse (not significant)** effect on the areas of Crossness LNR that will remain open and accessible during construction.

14.8.25 For the area of MOL and Southeast London Green Chain that falls outside of the Site, the magnitude of change is likely to be low due to the changes in amenity. Therefore, there is likely to be a direct, temporary, short term, **minor adverse (significant)** effect on the areas of MOL and the Southeast London Green Chain that fall outside of the Site, during construction.

14.8.26 The output of the PRoW and open space usage surveys, will inform a better understanding of the usage of the MOL and Southeast London Green Chain within the publicly accessible areas of the Site; this information will be presented within the ES. For the purpose of this PEIR, publicly available information has been used to determine the usage of the MOL and Southeast London Green Chain land (Eastern and Stable Paddocks and the Peabody land parcels).

14.8.27 The intention is that during construction, portions of the Mitigation Area will be open to the public, however, the extent of this is the subject of ongoing design development. This could mean that some areas of MOL and the Southeast London Green Chain within the Site may not be fully accessible to the public during the construction period... The potential for some permanent loss of MOL and Southeast London Green Chain land has been assessed as a long term construction impact.

14.8.28 Construction of the Proposed Scheme may lead to a loss in amenity to the MOL and Southeast London Green Chain, resulting from increases in noise and air pollution, and changes in views within the Site and the Study Area. Although, the surrounding area is predominantly industrial in nature, changes in the amenity of the land within the Site may also deter some users from the MOL and Southeast London Green Chain outside of the Site. As outlined in **Chapter 10: Townscape and Visual (Volume 1)**, construction activities will likely occupy a large portion of views from the MOL and Southeast London Green Chain.

14.8.29 For the assessment of effects on terrestrial recreation, the sensitivity of the MOL and the Southeast London Green Chain is medium.

14.8.30 For those areas of MOL and Southeast London Green Chain within the Site that may be partially lost, the magnitude of change is medium. Therefore, there is likely to be a direct, permanent, long term, **moderate adverse (significant)** effect on the areas of MOL and the Southeast London Green Chain during construction.

14.8.31 For the area of MOL and Southeast London Green Chain that fall outside of the Site, the magnitude of change is likely to be low due to the changes in amenity. Therefore, there is likely to be a direct, temporary, short term, **minor adverse (not significant)** effect on the areas of MOL and the Southeast London Green Chain which fall outside of the Site.

Effects on Recreational Users of the Thames

14.8.32 Vessel movements on the River Thames are likely to increase during the construction of the Proposed Scheme from barges delivering materials and components to the construction site of the Proposed Jetty. There may be several of these movements to and from the site per day, depending on the stage of the construction. Further details on this will be provided within the ES.

14.8.33 As identified within **Chapter 19: Marine Navigation (Volume 1)**, the construction of the Proposed Jetty and increased movements on the River Thames is likely to increase the potential risk of collision, contact and grounding of vessels.

14.8.34 Therefore, recreational users of the River Thames including anglers, sailors, rowers and those using motorboats and personal watercraft, have the potential to be adversely affected by increased vessel movements as well as an increase in the potential risk of collision, contact and grounding. In addition, users may also experience increased levels of fear and intimidation from increased vessel movements and construction works within the River Thames, which could deter some users.

14.8.35 There are requirements on the River Thames for larger vessels (including those that will likely be required during construction) to make use of the authorised channel allowing separation from smaller vessels, such as recreational traffic, which would ordinarily navigate outside of the navigational channel.

14.8.36 **Appendix 19-1: Preliminary Navigational Hazard Analysis (Volume 3)** states that vessels most commonly frequenting Halfway Reach (an area located within the authorised channel) are river trading non-passenger vessels, such as tugs and barges travelling to the various local wharfs and jetties, as well as commercial shipping transiting to and from central London. There is no significant recreational vessel activity within Halfway Reach.

14.8.37 For the assessment of effects on informal recreational users of the River Thames, the sensitivity of users is medium, due to the levels of current recreational activity. The magnitude of change is low. Therefore, there is likely to be an indirect, temporary, short term, **minor adverse** (**not significant**) effect on recreational users of the River Thames.

14.8.38 **Chapter 8: Marine Biodiversity (Volume 1)** does not assess effects on recreational fishing; however, it states that there is likely to be an indirect, permanent, long term, significant adverse effect on fish species of commercial value. Species are deemed to be of primarily low conservation value, but high commercial value. It should be noted that the magnitude of change is currently considered to be a low.

14.8.39 As set out in the EIA Scoping Report[40], the construction of the Proposed Scheme would not significantly decrease the enjoyment of recreational activities along and within the river due to the industrial location of the Proposed Scheme.

14.8.40 Informal angling activity is relatively low in the Study Area, meaning the sensitivity is low. The magnitude of impacts for anglers would be low, as set out in **Chapter 8: Marine Biodiversity (Volume 1)**. Therefore, there is likely to be an indirect, temporary, long term, **minor adverse (not significant)** effect on anglers of the River Thames.

14.8.41 As well as the above users, there are informal marine recreational receptors that use the River Thames and that may also potentially be affected by increased movements on the river. Users of these facilities may be deterred from undertaking recreational activities and user numbers may be temporarily decreased during construction of the Proposed Scheme. However, these changes are not likely to affect the overall viability of the recreational assets and therefore the magnitude of change is determined to be low. The effects on these receptors have been detailed in **Table 14-13** below.

Table 14-13: Construction Effects on Marine Recreational Receptors

Receptor	Direct/ Indirect	Permeance/ Duration	Sensitivity	Magnitude	Significance of Effects
Erith Rowing Club	Indirect	Temporary, short term	Medium	Low	**Minor adverse (not significant)**
Erith Yacht Club	Indirect	Temporary, short term	Medium	Low	**Minor adverse (not significant)**
Thamesmead fishing mark	Indirect	Temporary, long term	Low	Low	**Minor adverse (not significant)**
Erith Pier fishing mark	Indirect	Temporary, long term	Low	Low	**Minor adverse (not significant)**

Effects on Human Health, Mental Health and Wellbeing

Human Health

14.8.42 The likely significant effects for human health associated with the construction phase are set out in **Table 14-14** below. Other chapters of this PEIR have informed the summary of the effects on human health reported below. It should be noted that **Table 14-14** has taken the effects before the implementation of any additional mitigation required from each of technical chapters, and these would be mitigated as set out in each of the relevant chapters.

Table 14-14: Human Health Considerations Construction

Technical Topic/Chapter	Details
Chapter 5: Air Quality (Volume 1)	During construction, there is the potential to generate dust close to Crossness LNR and some residential properties. This could result in potential short term, temporary, direct adverse effects on human health as well as indirect impacts from a loss of amenity. A loss of amenity may deter some users of Crossness LNR and adjoining MOL and inhibit their ability to undertake physical activity. Temporary worsening of air quality may also adversely affect the health of the population, particularly those more vulnerable groups (such as the elderly, very young and those with underlying health conditions such as asthma).
Chapter 6: Noise and Vibration (Volume 1)	Noise generated during the terrestrial construction phase (including construction traffic) has the potential to adversely affect human receptors, which includes residential properties and businesses (specifically employees). This could result in potential short term, temporary, indirect adverse effects on human health.
Chapter 10: Townscape and Visual (Volume 1)	There is the potential for temporary and permanent changes to visual amenity. This may deter some users of PRoW, Crossness LNR as well as adjoining MOL and inhibit their ability to undertake physical activity.
Chapter 11: Water Environment and Flood Risk (Volume 1)	Construction of the Proposed Scheme has the potential to increase the rate and volume of surface water runoff generated and may increase the risk of flooding of residential properties and areas used by the public for physical activity (e.g. PRoW). Therefore, increased flooding could deter the public from undertaking physical activity. Experiencing disruption resulting from flooding can have physical and mental health impacts. Loss of utilities (gas, water and electricity), loss of personal possessions and potential financial losses as a consequence can be significant stressors which can adversely affect both physical and mental health.
Chapter 15: Socio-economics (Volume 1)	The construction of the Proposed Scheme is likely to result in between 176.3 and 235.1 net additional jobs, of which between 132.3 and 176.3 are estimated to be taken up by residents of Greater London, and between 44.1 and 58.8 by residents outside Greater London.

Technical Topic/Chapter	Details
	Employment improves health and wellbeing not only from an economic standpoint but also in terms of quality of life. This could therefore result in potential short term, indirect, temporary, beneficial effects on human health.
Chapter 18: Landside Transport (Volume 1)	There is potential for some users of PRoW to experience fear and intimidation during construction, due to the presence of construction traffic. The additional vehicles (both light and HGV) may also decrease levels of safety and increase the potential number of accidents for users.

14.8.43 When considering the outcomes of the assessments in relation to human health, the overall sensitivity of the population is considered to be medium. The magnitude of change is low as there will be a minor change in quality-of-life of residents and users of businesses, PRoW, Crossness LNR and MOL and a small proportion of the local population will be affected. Therefore, there is likely to be an indirect, temporary, short term, **minor adverse (not significant)** effect on human health.

Mental Health and Wellbeing

14.8.44 There is potential for adverse effects on mental health and wellbeing during the construction phase, associated with perception and uncertainty. This includes potential concerns, uncertainty and negative perceptions about the potential adverse impacts resulting from the construction of the Proposed Scheme.

14.8.45 Public concern is likely to be highest during the planning and construction stages, when there is most uncertainty about the potential impacts of the Proposed Scheme. This has potential to give rise to feelings such as stress and anxiety which may be associated with the following:

- potential future increase in noise pollution;
- potential health effects of air pollution;
- loss of and disturbance to recreational facilities, which may inhibit some peoples' abilities to undertake exercise;
- perceived risk of use of amine-based solvents; and
- potential public safety issues associated with pollution events, industrial accidents and flooding.

14.8.46 For the assessment of effects on mental health and wellbeing, the sensitivity of the local population is medium. The magnitude of change is low as the change in quality-of-life is likely to residents and users of PRoW, Crossness LNR and MOL, with a small proportion of the local population affected. Embedded mitigation measures will also secure that the change in quality of life will be minimal. Therefore, there is likely to be an indirect, temporary, medium term, **minor adverse (not significant)** effect on mental health and wellbeing.

OPERATION PHASE

14.8.47 The likely significant effects for population, health and land use associated with the operational phase are set out below.

Effects on Businesses that Rely upon Access to the River Thames

14.8.48 Once the Proposed Scheme is operational, it is anticipated that for the export of LCO_2 there will be between three (one Carbon Capture Plant) and five (two Carbon Capture Plants) scheduled export vessel calls per week for the smallest LCO_2 vessels, as well as up to ten tug arrivals and departures from the rear of the structure.

14.8.49 Given the number of vessel movements on the River Thames associated with the operation of the Proposed Scheme, the impacts on the operation and viability of Ford Dagenham and Crossness Sewage Treatment Works would be limited.

14.8.50 For the assessment of effects on those businesses that rely upon access to the River Thames, the sensitivity of both Ford Dagenham and Crossness Sewage Treatment Works is high. The magnitude of change is negligible. Therefore, there is likely to be a direct, permanent, long term, **negligible (not significant)** effect for both Ford Dagenham and Crossness Sewage Treatment Works.

Effects on Walkers and Cyclists

14.8.51 It is anticipated that once operational, the majority of PRoW within the Study Area will remain largely unaffected by the Proposed Scheme and all temporary construction diversions would be removed, although some PRoW (namely FP2) may be required to be permanently diverted. There may be some long term permanent reductions in amenity due to changes in visual amenity and operational noise, but this is unlikely to deter users due to the existing industrial location of the Site. **Chapter 10: Townscape and Visual (Volume 1)** of the PEIR provides further details on the changes to visual amenity as a result of the Proposed Scheme.

14.8.52 The effects on each of the PRoW has been recorded in **Table 14-15** below.

14.8.53 It should be noted that a PRoW usage and condition survey will be undertaken to inform the assessment to be presented in the ES. This could result in a change in the recorded sensitivity and subsequently could result in changes to the effects identified in **Table 14-15** below. The assessment will also be refined as part of the ES based on the finalised design of the Proposed Scheme.

Table 14-15: Operational Effects on Walking and Cycling Routes

Receptor	Direct/ Indirect	Permeance / Duration	Sensitivity	Magnitude	Significance of Effects
England Coast Path	Indirect	Permanent, long term	High	Negligible	**Negligible (not significant)**
NCN1	Indirect	Permanent, long term	High	Negligible	**Negligible (not significant)**
FP1	Indirect	Permanent, long term	Medium	Negligible	**Negligible (not significant)**
FP2	Indirect	Permanent, long term	Medium	Negligible	**Negligible (not significant)**
FP3	Indirect	Permanent, long term	Medium	Negligible	**Negligible (not significant)**
FP4	Indirect	Permanent, long term	Medium	Negligible	**Negligible (not significant)**
FP242	Indirect	Permanent, long term	Medium	Negligible	**Negligible (not significant)**

Effects on Terrestrial Recreation

14.8.54 The Proposed Scheme is partially located within the Crossness LNR and Erith Marshes SINC. A portion of the Erith Marshes SINC, the Peabody land within the Site Boundary, will form part of the Mitigation Area.

14.8.55 The intention is that once operational, portions of Crossness LNR and Erith Marshes SINC will be once again open to the public, however, the extent of this is the subject of ongoing design development and it is anticipated that some portions may be permanently lost. This change in land use may result in a permanent loss of amenity and potential for habitat loss and fragmentation which could lead to the disturbance, displacement and loss of biodiversity, in particular important habitats for wintering birds. These could have implications on the public's use and enjoyment of the LNR, particularly for bird watchers. However, as set out in **Chapter 7: Terrestrial Biodiversity (Volume 1)**, the ecological impact on the Crossness LNR and SINC, including the bird population is considered to be low.

14.8.56 **Chapter 10: Townscape and Visual (Volume 1)** concludes that proposed planting will establish over time to help integrate the Proposed Scheme into the landscape and screen views. This means that visual amenity can improve over time.

14.8.57 For the assessment of effects on terrestrial recreation, the sensitivity of Crossness LNR and Erith Marshes SINC is medium. The magnitude of change is low due to the low impact on bird populations and amenity given the industrial context. Therefore, there is likely to be a direct, permanent, long term, **minor adverse (not significant)** effect on the Crossness LNR and Erith Marshes SINC.

14.8.58 The Site is also located within an area of MOL and the Southeast London Green Chain. Both provide informal recreational opportunities including opportunities for walkers, runners and cyclists. The output of the PRoW usage surveys, which will determine the usage of the MOL and Southeast London Green Chain within publicly accessible areas within the Site, will be presented in the ES.

14.8.59 The operation of the Proposed Scheme will likely result in the permanent loss of amenity of both the MOL and Southeast London Green Chain land located within the Site and within the immediate vicinity of the Site (subject to ongoing design). Changes in the amenity of the land within the Site may also deter some users from the remaining MOL and Southeast London Green Chain land outside the Site but within the Study Area.

14.8.60 **Chapter 10: Townscape and Visual (Volume 1)** states that users of MOL and Southeast London Green Chain in close proximity to the Site Boundary would likely have direct views of the Proposed Scheme. The views would likely have some impact on the setting and visual amenity of the open space; however, they would be experienced in the context of the industrial nature of the townscape with several other developments of a similar nature and scale, including Riverside 1 and Riverside 2.

14.8.61 Proposed planting will establish over time, helping to integrate the Proposed Scheme into the landscape and screen views. This means that visual amenity can improve over time.

14.8.62 For the assessment of effects on terrestrial recreation, the sensitivity of the MOL and the Southeast London Green Chain is medium. The magnitude of change is low given the existing industrial setting. Therefore, there is likely to be a direct, permanent, long term, **minor adverse (not significant)** effect on the MOL and the Southeast London Green Chain land.

Effects on Recreational Users of the Thames

14.8.63 Once the Proposed Scheme is operational, it is anticipated that for the export of LCO_2 there will be between three (one Carbon Capture Plant) and five (two Carbon Capture Plants) scheduled export vessel calls per week for the smallest LCO_2 vessels, as well as up to ten tug arrivals and departures from the rear of the structure.

14.8.64 Given that this section of the River Thames is already heavily used by large vessels and the operation of the Proposed Scheme would not substantially increase levels of marine traffic, effects on recreational users and recreational facilities located on the River Thames are likely to be limited.

14.8.65 **Chapter 8: Marine Biodiversity (Volume 1)** does not assess effects on recreational fishing. However, it does conclude that there is likely to be an indirect, permanent, long term**,** significant adverse effect on fish species of commercial value. Species are deemed to be of primarily low conservation value, but high commercial value. It should be noted that the magnitude of change is currently considered to be a low.

14.8.66 For the assessment of effects on recreational users of the River Thames, the sensitivity of users is medium. The magnitude of change is negligible given the low numbers of vessel movements required. Therefore, there is likely to be an indirect, permanent, long term, **negligible (not significant)** effect on recreational users of the Thames.

14.8.67 Informal angling is relatively low in the Study Area, meaning the sensitivity is low. The magnitude of impacts for anglers would be low, because there would be a limited impact on the fish population however, as set out in **Chapter 8: Marine Biodiversity (Volume 1)** there may still be some disturbance to some species from operational dredging. Therefore, there is likely to be an indirect, temporary, long term, **minor adverse (not significant)** effect on anglers of the River Thames.

14.8.68 The effects on these marine recreational receptors/facilities have been detailed in **Table 14-16** below.

Table 14-16: Operational Effects on Marine Recreational Receptors

Receptor	Direct/ Indirect	Permeance/ Duration	Sensitivity	Magnitude	Significance of Effects
Erith Rowing Club	Indirect	Permanent, long term	Medium	Negligible	**Negligible (not significant)**
Erith Yacht Club	Indirect	Permanent, long term	Medium	Negligible	**Negligible (not significant)**
Thamesmead fishing mark	Indirect	Permanent, long term	Low	Low	**Minor adverse (not significant)**
Erith Pier fishing mark	Indirect	Permanent, long term	Low	Low	**Minor adverse (not significant)**

Effects on Human Health, Mental Health and Wellbeing

Human Health

14.8.69 The likely significant effects for human health associated with the operation phase are set out in **Table 14-17** below. Other chapters of this PEIR have informed the summary of the effects on human health reported below. It should be noted that **Table 14-17** has taken the effects before the implementation of any additional mitigation required from each of technical chapters and would be mitigated as set out in each of the relevant technical chapters.

Table 14-17: Human Health Considerations Operation

Technical Topic/ Chapter	Details
Chapter 5: Air Quality (Volume 1)	The operation of the Proposed Scheme will introduce emissions of new pollutants (including amines and aldehydes) that have the potential to affect human health, and deposit to surfaces. Worsening of air quality could adversely affect the health of the local population, particularly those more vulnerable groups (such as the elderly, very young and those with underlying health conditions such as asthma).
Chapter 6: Noise and Vibration (Volume 1)	Noise generated during operation phase has the potential to adversely affect sensitive receptors which includes residential properties and businesses (more specifically employees). This could result in potential long term, permanent, adverse impacts on human health as well as amenity. This may deter some users of PRoW, Crossness LNR as well as adjoining MOL and South East Green Chain and inhibit their ability to undertake physical activity.
Chapter 10: Townscape and Visual (Volume 1)	There is the potential for permanent changes to visual amenity. This may deter some users of PRoW, Crossness LNR as well as adjoining MOL and South East Green Chain and inhibit their ability to undertake physical activity.
Chapter 11: Water Environment and Flood Risk (Volume 1)	Operation of the Proposed Scheme has the potential to increase the potential for the River Thames to breach flood defences, posing a risk to people. The increased risk of flooding of residential properties and areas used by the public for physical activity (e.g. PRoW). Therefore, increased flooding could deter the public from undertaking physical activity.

Technical Topic/ Chapter	Details
	Experiencing disruption as a consequence of flooding can have physical and mental health impacts. Loss of utilities (gas, water and electricity), loss of personal possessions and potential financial losses can be significant stressors which can adversely affect both physical and mental health. Further details will be provided in the Flood Risk Assessment which will be prepared as an appendix to **Chapter 11: Water Environment and Flood Risk (Volume 1)** at the ES stage.
Chapter 20: Major Accidents and Disasters (Volume 1)	Once operational, there is potential for a large scale release of CO_2 resulting from a loss of containment event involving a pipeline and/or storage tank, pipeline and/or connection to the marine vessel and/or from a loss of containment event involving a marine vessel. This has potential to result in CO_2 toxicity and fogging hazard, which could affect neighbouring properties and/or those people in the immediate area including users of PRoW and open space as well as marine users.

14.8.70 When considering the outcomes of the assessments in relation to human health, the overall sensitivity of the population is considered to be medium. The magnitude of change is low, as there would be a minor change in quality-of-life of residents and users of businesses, PRoW, Crossness LNR and MOL and a small proportion of the local population will be affected. Therefore, there is likely to be an indirect, permanent, long term, **minor adverse (not significant)** effect on mental health and wellbeing.

Mental Health and Wellbeing

14.8.71 There is potential for adverse effects on mental health and wellbeing during the operational phase, associated with perception and uncertainty. This includes potential concerns, uncertainty and negative perceptions about the potential adverse impacts resulting from the operation of the Proposed Scheme. This has potential to give rise to feelings such as stress and anxiety which may be associated with the following:

- potential health effects of air pollution;
- perceived risk of use of amine-based solvents; and
- potential public safety issues associated with pollution events, industrial accidents and flooding.

14.8.72 For the assessment of effects on mental health and wellbeing, the sensitivity of the local population is medium. The magnitude of change is low as the change in quality-of-life is likely to be minimal and a small minority of the local population will be affected. Embedded mitigation measures will ensure the change in quality of life will be minimal, and once operational it is likely that public concerns and anxiety may be reduced. Therefore, there is likely to be an indirect, permanent, long term, **minor adverse (not significant)** effect on mental health and wellbeing.

14.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

14.9.1 This section sets out the additional mitigation and compensation measures which are relevant for population, health and land use.

CONSTRUCTION PHASE

- The public will be informed of the nature, timing and duration of particular construction activities and the duration of the construction works by newsletters/other publications or advertisements.
- The appointed contractor will prepare a construction-specific community engagement plan for the construction operations of the Proposed Scheme. The plan will provide the overall approach to community engagement and a detailed guide to the enquiries and complaints procedure.
- Ongoing engagement with the local community would provide information which may help to reduce uncertainty and stress relating to the potential effects of the Proposed Scheme.
- Early engagement will be undertaken with the gypsy and traveller community.
- Where possible, those areas of Crossness LNR, Southeast London Green Chain and MOL that fall within, or close to, the Site that are currently accessible to the public should remain so during construction. Where possible, works will be screened to minimise adverse effects on the amenity value and enjoyment of these areas.
- Clear signage and directions for any alternative routes and appropriate alternative diversions would be provided and diversions clearly publicised to maintain access.
- A passage plan for vessel movements during the construction phase would be created prior to the commencement of construction, maintained by the Applicant and provided to the PLA.
- Signage to advertise that businesses are open and operating as normal can be provided.

OPERATION PHASE

- Ongoing engagement with local communities and other stakeholders would provide information which may help to reduce uncertainty and stress relating to the potential effects of the Proposed Scheme.
- Once operational the Proposed Scheme could consider some of the following enhancement measures:
  - inclusion of a bike hub that includes safe storage and bike tools;
  - improvements to PRoW (Including surfaces and widths) to ensure they are accessible for all user groups;
  - inclusion of/updates to existing street furniture including benches, bins and signage; and
  - new information boards detailing the Proposed Scheme and other points of interest.

14.10. MONITORING

14.10.1 There are no proposed monitoring arrangements for population, human health and land use. Where appropriate, monitoring associated with other assessments are described within the relevant technical chapters.

14.11. RESIDUAL EFFECTS

14.11.1 **Table 14-18** below summarises the residual effects associated with the Proposed Scheme.

Table 14-18: Population, Health and Land Use Summary of Residual Effects

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual effect
Construction Phase				
Effects on Terrestrial Businesses	Munster Joinery	**Major Adverse (significant)**	Engagement with local business. The Applicant is currently seeking to identify a suitable site for the relocation of Munster Joinery; however, this has not been identified at this stage of the Proposed Scheme.	**Major Adverse (significant)**
	Iron Mountain	**Moderate Adverse (significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Minor Adverse (not significant)**
	Asda Belvedere Distribution Centre	**Moderate Adverse effect (significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Minor Adverse (not significant)**
	Travelodge London Belvedere	**Minor Adverse (not significant)**	Engagement with local business.	**Negligible (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual effect
			Signage to advertise that businesses are open and operating as normal.	
	The Morgan	**Minor Adverse (not significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Negligible (not significant)**
	Snap Fitness	**Minor Adverse (not significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Negligible (not significant)**
	Lidl Belvedere Regional Distribution Centre	**Moderate Adverse effect (significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Minor adverse (not significant)**
	Tap'in 3PL Ltd	**Minor Adverse (not significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Negligible (not significant)**
	Howdens Joinery	**Minor Adverse (not significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Negligible (not significant)**
	Ctr Group	**Minor Adverse (not significant)**	Engagement with local business.	**Negligible (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual effect
			Signage to advertise that businesses are open and operating as normal.	
	HS Carlsteel Engineering Ltd	**Minor Adverse (not significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Negligible (not significant)**
	Freshasia Foods Ltd.	**Minor Adverse (not significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Negligible (not significant)**
	Intersped Logistics (UK) Limited	**Minor Adverse (not significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Negligible (not significant)**
Effects on Businesses that rely upon access to the River Thames	Ford Dagenham	**Negligible (not significant)**	Engagement with local business. Development of a Passage Plan	**Negligible (not significant)**
	Thames Water – Crossness Water Treatment Works	**Negligible (not significant)**	Engagement with local business. Development of a Passage Plan	**Negligible (not significant)**
Effects on Walkers and Cyclists	England Coast Path	**Moderate Adverse (significant)**	Engagement with users through clear signage on planned disruption	**Minor Adverse (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual effect
	NCN1	**Moderate Adverse (significant)**	Engagement with users through clear signage on planned disruption	**Minor Adverse (not significant)**
	FP1	**Minor Adverse (not significant)**	Engagement with users through clear signage on planned disruption	**Negligible (not significant)**
	FP2	**Moderate Adverse (significant)**	Engagement with users and clear signage of diversions.	**Minor Adverse (not significant)**
	FP3	**Minor Adverse (not significant)**	Engagement with users through clear signage on planned disruption	**Negligible (not significant)**
	FP4	**Moderate Adverse effect (significant)**	Engagement with users and clear signage of diversions.	**Minor Adverse effect (not significant)**
	FP242	**Minor Adverse effect (not significant)**	Engagement with users through clear signage on planned disruption	**Negligible (not significant)**
Effects on Terrestrial Recreation	Crossness LNR (areas permanently lost)	**Moderate Adverse (significant)**	Engagement with users.	**Moderate Adverse (significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual effect
	Crossness LNR (areas outside of the Site Boundary and areas within the Site that won't be permanently lost)	**Minor Adverse (not significant)**	Engagement with users.	**Minor Adverse (not significant)**
	Erith Marshes SINC (areas permanently lost)	**Moderate Adverse (significant)**	Engagement with users.	**Moderate Adverse (significant)**
	Erith Marshes SINC (areas outside of the Site Boundary and areas within the Site that won't be permanently lost)	**Minor Adverse (not significant)**	Engagement with users.	**Minor Adverse (not significant)**
	MOL (areas permanently lost)	**Moderate Adverse (significant)**	Engagement with users.	**Moderate Adverse (significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual effect
	MOL (areas outside of the Site Boundary and areas within the Site that won't be permanently lost)	**Minor Adverse (not significant)**	Engagement with users.	**Minor Adverse (not significant)**
	Southeast London Green Chain (areas permanently lost)	**Moderate Adverse (not significant)**	Engagement with users.	**Moderate Adverse (significant)**
	Southeast London Green Chain (areas outside of the Site Boundary and areas within the Site that won't be permanently lost)	**Minor Adverse (not significant)**	Engagement with users.	**Minor Adverse (not significant**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual effect
	Grazing land used by gypsies and travellers	To be determined following completion of modelling work and surveys and presented within the ES.	Potential effects would be mitigated through engagement with users, but requirements to be determined.	To be determined following completion of modelling work and surveys and presented within the ES.
Effects on Recreational Users of the Thames	Recreational users	**Minor Adverse effect (not significant)**	Engagement with users.	**Minor Adverse (not significant)**
	Erith Yacht Club	**Minor Adverse (not significant)**	Engagement with users.	**Negligible (not significant)**
	Erith Rowing Club	**Minor Adverse (not significant)**	Engagement with users.	**Negligible (not significant)**
	Thamesmead fishing mark	**Minor Adverse (not significant)**	Engagement with users.	**Negligible (not significant)**
	Erith Pier fishing mark	**Minor Adverse (not significant)**	Engagement with users.	**Negligible (not significant)**
Effects on Human Health	Local Population	**Minor Adverse (not significant)**	Ongoing engagement with the local community.	**Negligible (not significant)**
Effects on Mental health and wellbeing	Local Population	**Minor Adverse (not significant)**	Ongoing engagement with the local community.	**Negligible (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual effect
Operation Phase				
Effects on Businesses that rely upon access to the River Thames	Ford Dagenham	**Negligible (not significant)**	Engagement with local business. Development of a Passage Plan	**Negligible (not significant)**
	Thames Water – Crossness Water Treatment Works	**Negligible (not significant)**	Engagement with local business. Development of a Passage Plan	**Negligible (not significant)**
Effects on Walkers and Cyclists	England Coast Path	**Negligible (not significant)**	Engagement with users with new information boards detailing the Proposed Scheme and other points of interest.	**Negligible (not significant)**
	NCN1	**Negligible (not significant)**	Engagement with users with new information boards detailing the Proposed Scheme and other points of interest.	**Negligible (not significant)**
	FP1	**Negligible (not significant)**	Engagement with users with new information boards detailing the Proposed Scheme and other points of interest.	**Negligible (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual effect
	FP2	**Negligible (not significant)**	Engagement with users with new information boards detailing the Proposed Scheme and other points of interest.	**Negligible (not significant)**
	FP3	**Negligible (not significant)**	Engagement with users with new information boards detailing the Proposed Scheme and other points of interest.	**Negligible (not significant)**
	FP4	**Negligible (not significant)**	Engagement with users with new information boards detailing the Proposed Scheme and other points of interest.	**Negligible (not significant)**
	FP242	**Negligible (not significant)**	Engagement with users with new information boards detailing the Proposed Scheme and other points of interest.	**Negligible (not significant)**
Effects on Terrestrial Recreation	Crossness LNR	**Minor Adverse (not significant)**	Engagement with users.	**Minor Adverse effect (not significant)**
	MOL	**Minor Adverse (not significant)**	Engagement with users.	**Minor Adverse effect (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual effect
	Southeast London Green Chain	**Minor Adverse (not significant)**	Engagement with users.	**Minor Adverse effect (not significant)**
Effects on Recreational Users of the Thames	Recreational users	**Negligible (not significant)**	Engagement with users.	**Negligible (not significant)**
	Erith Rowing Club	**Negligible (not significant)**	Engagement with users.	**Negligible (not significant)**
	Erith Yacht Club	**Negligible (not significant)**	Engagement with users.	**Negligible (not significant)**
	Thamesmead fishing mark	**Minor Adverse (not significant)**	Engagement with users.	**Negligible (not significant)**
	Erith Pier fishing mark	**Minor Adverse (not significant)**	Engagement with users.	**Negligible (not significant)**
Effects on Human Health	Local Population	**Minor Adverse effect (not significant)**	Ongoing engagement with the local community through project information boards surrounding the site and updates on operational activities and planned maintenance via the Applicant's website.	**Negligible (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual effect
Effects on Mental health and wellbeing	Local Population	**Minor Adverse effect (not significant)**	Ongoing engagement with the local community through project information boards surrounding the site and updates on operational activities and planned maintenance via the Applicant's website.	**Negligible (not significant)**

14.12. NEXT STEPS

14.12.1 Further work to be completed and included in the ES comprises:

- The population, health and land use assessment will be further developed and refined having regard to any relevant responses to the Statutory Consultation.
- The detailed assessment within the ES will involve a review of the population, health and land use assessment presented in this chapter, based on further information as part of ongoing design development in accordance with the methodologies outlined in **Section 14.4** above.
- There will be ongoing engagement with key stakeholders and land owners as well as affected businesses and site users where appropriate.
- PRoW and open space usage and condition surveys will be completed.
- The detailed assessment within the ES will involve a review of the Population and Human Health assessment presented in this chapter, based on further information as part of ongoing design development, particularly in relation to the relocation of Munster Joinery.
- There will be ongoing engagement with both landowners and the gypsy and traveller community that use land within the Site, to determine the usage of this land and whether horses are used for business or recreational purposes.

14.13. LIMITATIONS AND ASSUMPTIONS

14.13.1 This section outlines the limitations, uncertainties, and assumptions made in undertaking the population, health and land use assessment reported in this chapter.

- This assessment has been undertaken as a desk-based study, using publicly available information.
- This chapter has relied, in part, on data provided by third parties (e.g., OS Mapping, Local Authorities, NOMIS) which are the most up-to-date, available at the time of writing. No significant changes or limitations in these datasets have been identified that would affect the robustness of the assessment.

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DECARBONISATION

CHAPTER 15: SOCIO-ECONOMICS

Cory Decarbonisation Project

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TABLE

15. SOCIO-ECONOMICS

15.1. INTRODUCTION

15.1.1. This chapter reports the preliminary assessment of the likely significant effects of the Proposed Scheme on socio-economics during construction and operation and describes:

- relevant policy, legislation and guidance;
- consultation and engagement undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operational phase.

15.2. POLICY AND GUIDANCE

15.2.1. The policy, and guidance relevant to the assessment of socio-economics for the Proposed Scheme is detailed in **Table 15-1.**

15.2.2. Socio-economics is not governed by legislation in the way that other technical topics are; consequently, legislation is not included in **Table 15-1.**

Table 15-1: Socio-economics Summary of Key Policy and Guidance

Policy or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011[1]	Sets out the Government's policy for delivery of major energy infrastructure and is currently the primary basis for decision making of applications within the Planning Act 2008 regime. Section 5.12.2 states that *"Where the project is likely to have socio-economic impacts at local or regional levels, the applicant should undertake and include in their application an assessment of these impacts as part of the ES".*
Draft Overarching National Policy Statement (NPS) for Energy EN-1 2023[2]	This Draft Overarching National Policy Statement for Energy (EN-1) is part of a suite of draft NPSs issued by the Secretary of State of DESNZ. It sets out the government's policy for delivery of major energy infrastructure and will likely replace the 2011 NPSs by the time the application for the Proposed Scheme is submitted. Paragraph 5.13.2 states that *"Where the project is likely to have socio-economic impacts at local or regional levels, the applicant should undertake and include in their application an assessment of these impacts as part of the ES".*

Policy or Guidance	Description
National Planning Policy Framework (NPPF) 2023[3]	The NPPF sets out the Government's planning policies for England and how these should be applied, with the following paragraphs relating to socio-economics: Paragraph 81: "*Planning policies and decisions should help create the conditions in which businesses can invest, expand and adapt. Significant weight should be placed on the need to support economic growth and productivity, taking into account both local business needs and wider opportunities for development*." Paragraph82a: "*Planning policies should set out a clear economic vision and strategy which positively and proactively encourages sustainable economic growth*." Paragraph 83: "*Planning policies and decisions should recognise and address the specific locational requirements of different sectors. This includes making provision for clusters or networks of knowledge and data-driven, creative or high technology industries; and for storage and distribution operations at a variety of scales and in suitably accessible locations*."
The London Plan 2021[4]	The Spatial Development Strategy for Greater London sets out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policy GG5: Growing a Good Economy emphasises London's global economic position and the need to promote the strength and potential of the wider region. It seeks to ensure economic diversity, and plan for the delivery of sufficient employment space, as well as recognising the wider impacts housing, transport, and culture can have on economic success. Policy SD1: Opportunity Area states that the Mayor will "*monitor progress in delivering homes, jobs and infrastructure, taking action where necessary to overcome any barriers to delivery".* Boroughs should "*support development which creates employment opportunities and hosing choice for Londoners*" and "*support and sustain Strategic Industrial Locations (SIL) and other industrial capacity by considering opportunities to intensify and make more efficient use of land in SIL".* Policy E5: Strategic Industrial Locations (SIL) states that SILs should "*be managed proactively through a plan-led process to sustain them as London's largest concentrations of*

Policy or Guidance	Description
	industrial, logistics and related capacity for uses that support the functioning of London's economy" and "*Development proposals in SILs should be supported where the uses proposed fall within the industrial-type activities set out in Part A of Policy E4 Land for industry, logistics and services to support London's economic function*" which includes utilities infrastructure.
The Bexley Local Plan 2023[5]	The Local Plan, adopted on 26 April 2023, sets out planning policies and proposals for new development. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. The Local Plan also helps to ensure the timely delivery of essential infrastructure and services to support proposed growth in housing and employment. It positively plans for sustainable development across the Borough. Policy SP3: Employment Growth, Innovation and Enterprise states that "*Bexley will continue to play a key role in contributing to London's economic growth and prosperity. The Council will support the economic growth of at least 10,800 (net) new jobs over the plan period, of which approximately 1,900 to 2,700 of these will be located within Bexley's designated industrial locations"*. The Council will promote sustained development and employment growth, providing residents of all abilities with opportunities to access local jobs and enable local businesses to draw upon a wide range of skilled workers and employment premises. The policy protects SIL for industrial type activities and related functions.
Bexley Growth Strategy 2017[6]	The Bexley Growth Strategy sets out the coordinated effort across organisations to maximise the benefits of growth for the borough's current and future residents and businesses. It details how the Council, working with a range of partners, proposes to positively manage housing and economic growth and its associated supporting infrastructure in the borough into the future. The Strategy covers a 30-year period to 2050.
London Environment Strategy 2018[7]	The London Environment Strategy seeks to ensure that London will become a "*zero carbon city by 2050*" by setting out policies and proposals in seven policy areas to address environmental challenges, including the transition to a low carbon circular economy. The Mayor wants to ensure

Policy or Guidance	Description
	"*London's businesses and workers are supported to be able to compete effectively in, and benefit from, this growing global market*".
South East Inshore Marine Plan 2021[8]	The South East Inshore Marine Plan area stretches from Felixstowe in Suffolk to west of Dover in Kent and incorporates the River Thames. The South East Inshore Marine Plan will help to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan area. Policy SE-INF-1 states that "…*supporting infrastructure development, diversification and regeneration will provide socio-economic benefits and support marine business, including those that are land-based*…". In addition, Policy SE-CO-1 advises that proposals must demonstrate that they will avoid, minimise or mitigate any significant adverse impacts on existing activities.
Guidance	
National Planning Practice Guidance (2021)[9]	Explains the processes and tools that can be used through the planning system in England. This includes guidance on healthy and safe communities. It promotes good design that incorporates security as an intrinsic part of a development to achieve places that are safe and attractive, which function well, and which do not need subsequent work to achieve or improve resilience.
Employment Density Guide 3rd Edition 2015[10]	Provides an employment density matrix for the different use classes, as a guide for the employment assessment.
Additionality Guide 4th Edition 2014[11]	Guidance for composite multipliers (the combined effect of indirect and induced multiplier effects) displacement and leakage rates that should be applied within the employment assessment.

15.3. SCOPING OPINION AND CONSULTATION

15.3.1. An EIA Scoping Opinion[12] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26th May 2023. The responses from the Planning Inspectorate in relation to socio-economics and how these requirements will be addressed by the Applicant are set out in **Table 15-2** below.

Table 15-2: Summary of the EIA Scoping Opinion in Relation to Socio-economics

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
3.11.1	Increased demand for accommodation and community facilities due to an influx of construction workers	*"The Scoping Report states that given the level of facilities in the vicinity of the application site, good transport linkages and workforce to be utilised, it is not anticipated that there would be a significant increase in demand for accommodation or social infrastructure such as community and recreational resources from construction workers relocating close to the Proposed Development.* *Whilst details of the estimated construction workforce have not been provided, in view of the location and nature of the Proposed Development and the anticipated duration of the construction works, the Inspectorate considers that significant effects are unlikely to occur. Increased demand for accommodation and community facilities due to an influx of construction workers can be scoped out of the ES."*	No response required.
3.11.2	Crime and safety – construction and operation	*"The Scoping Report explains that site security arrangements during construction will be in line with relevant regulatory requirements and with appropriate levels of security, CCTV and fencing in place during both construction and operation. It is also stated that consultation is likely to be undertaken with the Metropolitan Police Liaison Officer and Port of London Authority as part of the design of the Proposed Development.*	The application for development consent will include provision for mariner notifications.

Section ID	Applicant's Proposed Matters to Scope Out	Planning Inspectorate's Comments	Response
		On this basis, and subject to the ES explaining what mechanism would be in place to ensure that advance notice of construction activities in the River Thames is provided to the Port of London Authority, the Inspectorate is content that significant effects are not likely. Crime and safety during construction and operation can be scoped out of the ES."	
3.10.5	Scope of assessment - tourism	*"The Scoping Report identifies recreational facilities that may be impacted by the Proposed Development (some of which appear to be tourism facilities) but does not specifically explain if/ how impacts on tourism are to be considered as part of the socio-economic assessment. Impacts on tourist businesses should be assessed in the ES where significant effects are likely".*	**Chapter 14: Population, Health and Land Use (Volume 1)** sets out the effects of the Proposed Scheme on terrestrial and marine businesses, users of Public Rights of Way, recreational users of the River Thames and terrestrial recreation. The chapter also identifies where these receptors may serve tourists, and any associated tourism impacts. The socio-economics assessment does not include a separate tourism economy assessment as those businesses affected by the Proposed Scheme are not tourism related businesses due to the industrial location of the Proposed Scheme.

15.3.2. **Table 15-3** provides a summary of the consultations undertaken to inform the socio-economics assessment to date.

Table 15-3: Socio-economics Consultation and Engagement Summary

Date and Method of Consultation	Consultee	Summary of Key Topics Discussed and Key Outcomes
26th May 2023, EIA Scoping Opinion	London Borough of Bexley (LBB)	Within the EIA Scoping Opinion, LBB confirmed that "*The Council is generally satisfied at the details submitted in this [socio-economics] chapter and that the applicant has adequately addressed this issue at this stage*". As LBB was satisfied with the assessment methodology set out in Chapter 14: Socio-economics of the EIA Scoping Report[13], the Council has not been contacted further.

15.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

15.4.1. The assessment presented in this chapter focuses on the socio-economic effects of the Proposed Scheme, in line with the policy and guidance described in **Section 15.2** of this chapter.

POTENTIALLY SIGNIFICANT EFFECTS

15.4.2. As identified in the EIA Scoping Report[13], the following effects are considered to be significant and have been considered further in this assessment:

- Construction Phase:
  - employment generation (direct, indirect and induced); and
  - GVA.
- Operation Phase:
  - employment generation (direct, indirect and induced); and
  - GVA.

MATTERS SCOPED OUT

15.4.3. The following effects are considered unlikely to be significant and therefore have not been considered further in this assessment:

- increased demand for accommodation and community facilities due to an influx of construction workers; and
- crime and safety during the construction and operation of the Proposed Scheme.

15.4.4. As set out in **Table 15-2**, the Planning Inspectorate agrees that these effects are not likely to be significant and, therefore, do not need to be considered further (see **Section 15.3** for details).

SENSITIVE RECEPTORS

15.4.5. The following sensitive receptors have been identified:

- Economic receptors, including working age individuals within the local and regional level Study Areas, local businesses within the Study Area including those that may provide services or accommodation, either through supply chain linkages or accommodation to construction employees.

BASELINE DATA COLLECTION

15.4.6. A desk-based data collection exercise has been undertaken, including review of available information, to determine the baseline conditions in the relevant geographical areas of effect.

15.4.7. The key sources of information used to determine the socio-economics baseline conditions are:

- Ordnance Survey Mapping[14];
- NOMIS Labour Market Profiles[15];
- Munster Joinery website[21];
- Bexley Local Plan 2023[5];
- The London Plan 2021[4];
- London Plan 2023 Allocation Map[5]; and
- Bexley Growth Strategy[6].

ASSESSMENT METHODOLOGY

15.4.8. A review of local, regional and national socio-economics planning policies and strategies has been undertaken and considered as part of the PEIR. A desk-based review of publicly available socio-demographic information has also been undertaken to understand the baseline conditions in relation to the population as well as economy and employment at the local and regional level.

15.4.9. The assessment methodology for the generation of employment and Gross Value Added (GVA) has been based on Homes and Communities Agency (now known as Homes England) Employment Density Guide 3rd Edition[10] and also on their Additionality Guide 4th Edition[11]. It should be noted that whilst both the Employment Density Guide[10] and Additionality Guide[11] documents were withdrawn in 2022,; no statement on replacement guides to be published by the UK Government has been made and both are still available for reference. It is considered that in the absence of any further guidance on employment density and additionality, these documents remain relevant and appropriate guidance documents.

15.4.10. Socio-economics effects have been assessed for both the construction and operation phases of the Proposed Scheme. As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, two construction programme options are being considered. Both options have been considered within the construction employment and GVA assessments.

Construction Phase Assessment Methodology

Construction Employment

15.4.11. The gross employment generated by the temporary construction phase has been estimated by applying an average gross output per construction industry employee, from 2019[a], of £88,946.51 to the estimated total construction cost. The average gross output per construction industry employee has been calculated using the Construction Output in Great Britain data[16] and Business Register and Employment Survey (BRES) Construction Industry Data[17]. Leakage, displacement, and multiplier effects were then applied to identify total net employment.

Leakage

15.4.12. Leakage effects are the "*proportion of outputs that benefit those outsides of the intervention's target area or group*"[11]. The Additionality Guide[11] provides indicative guidance on the level of the leakage factor that can be applied. Data from the Office for National Statistics indicated that 17.8% of people working in Greater London lived outside the area in 2018[18]. Therefore, a medium level of leakage (25%) has been deemed appropriate for the assessment, as a worst-case scenario, in line with the Additionality Guide levels. This implies a reasonably high proportion of employment opportunities would go to people living within the target (effect) area (i.e., local and regional Study Areas).

Displacement

15.4.13. Displacement measures the extent to which the benefits of a project are offset by reduction of output or employment elsewhere[11]. Additional demand for labour as a result of the construction stage of the Proposed Scheme cannot simply be treated as a net benefit as it has the potential to remove workers from other positions, and the net benefit is therefore reduced by the extent that this occurs.

15.4.14. Construction workers typically move between construction projects in Greater London when delays occur or to help the workforce meet construction deadlines. Overall, it is assumed that, due to the flexibility of the labour market and the fact that construction workers at the Proposed Scheme represent a small proportion of the overall Greater London construction labour force, displacement of the direct construction employment would be low.

[a] It is acknowledged that more recent output per construction employee data has been released. However, the most recent data covers the years affected by COVID-19 which provides a lower output per construction employee, which when applied to the calculation leads to an artificially inflated number of generated employment opportunities. Therefore, in order to present a worst-case scenario, the data available prior to COVID-19 (2019) has been used for the calculation.

15.4.15. The Additionality Guide provides guidance on the levels of displacement. Within the context of a Greater London construction project, a low level of displacement of 25% will be applied, where "*there are expected to be some displacement effects, although only to a limited extent*"[11].

Multiplier Effects

15.4.16. In addition to the direct employment generated by the Proposed Scheme itself, there would be an increase in local employment arising from "*further economic activity (jobs, expenditure or income) associated with additional local income and local supplier purchases*"[11] the indirect and induced effects of the construction activity. Employment growth would arise locally through manufacturing services and suppliers to the construction process (indirect or supply linkage multipliers). Additionally, part of the income of the construction workers and suppliers would be spent in Greater London, generating further employment (induced or income multipliers).

15.4.17. The effects of the multiplier depend on the size of the geographical area that is being considered, the local supply linkages and income leakage from the area. The Homes and Communities Agency's Additionality Guide[11] provides a guide to the composite multipliers (the combined effect of indirect and induced multiplier effects) which should be applied. In line with this guidance, as the Greater London region is likely to have strong local supply linkages a 'high' multiplier of 1.7 has been applied.

Construction GVA

15.4.18. GVA is the measure of the value of goods and services produced in an area, industry or sector of an economy. It equates to the value of output minus the value of intermediate consumption. GVA has been estimated by applying an average GVA benchmark per construction employee to the estimated net construction jobs generated by the Proposed Scheme, for both within and outside of Greater London. The GVA benchmark has been estimated using the employment figures within the BRES[19] and the GVA value within the Regional Gross Value Added dataset[20]; both of which are available from the Office for National Statistics. The methodology for estimating GVA is based on a standard industry accepted approach for UK projects.

Operation Phase Assessment Methodology

Operation Employment

15.4.19. As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, the Applicant will seek to relocate Munster Joinery to a location in close proximity to the Proposed Scheme or elsewhere by agreement between the parties. However, as the relocation site has not been identified or secured at the time of writing, the potential job losses associated with the demolition of the Munster Joinery premises have been considered within the assessment as a worst-case scenario. The potential job losses are referred to as 'deadweight'. Deadweight is defined as a loss of or disruption to existing economic activity currently taking place onsite[10]. The number of existing employees working at Munster Joinery (i.e., deadweight) was not known at the time of writing and, therefore, was calculated for the PEIR as a worst case scenario. The actual number of existing employees at Munster Joinery will be obtained and used in the assessment at the ES stage.

15.4.20. For the operation employment calculations, the Homes and Communities Agency (now known as Homes England) Employment Density Guide[10] has been applied to the employment generating floorspace within the Proposed Scheme to provide an estimate of the total gross jobs onsite. To determine the net operational employment, the net 'deadweight' onsite, relating to Munster Joinery, has been discounted from the gross impact and a leakage rate of 25%, a low level of displacement of 25%, and a 1.7 multiplier applied.

Operation GVA

15.4.21. GVA has been estimated by applying an average GVA benchmark per operational employee to the estimated net operational jobs generated by the Proposed Scheme, for both within and outside of Greater London. The GVA benchmark has been estimated using the employment figures within the BRES[19] and the GVA value within the Regional Gross Value Added dataset[20]; both of which are available from the Office for National Statistics. The methodology for estimating GVA is based on a standard industry accepted approach for UK projects.

Significance Criteria

15.4.22. The socio-economics assessment seeks to establish the potential socio-economics impacts of the Proposed Scheme and assess these against the current baseline conditions. The impacts of the Proposed Scheme are considered at varying spatial levels according to the nature of the impact. This approach is consistent with the Homes and Communities Agency's Additionality Guide[11].

15.4.23. The sensitivity of receptors has been identified on a case-by-case basis with reference to relevant guidance where applicable and/or by employing professional judgement; determination of sensitivity varies depending on the type of receptor.

Classifying Effects

15.4.24. The assessment of potential effects uses the scale described within **Chapter 4: EIA Methodology (Volume 1)**. In this chapter, expert judgment has been used to assess the scale of the effects of the Proposed Scheme against the baseline conditions.

15.4.25. For socio-economics, there is no accepted definition of what constitutes a significant (or not significant) effect. It is, however, recognised that 'significance' reflects the relationship between the scale of impact (magnitude) and the sensitivity (or value) of the affected resource or receptor.

15.4.26. As such effects have been assessed on the basis of:

- Consideration of sensitivity to effects – specific values in terms of sensitivity are not attributed to socio-economic resources/receptors due to their diversity in nature and scale. The assessment instead takes account of the qualitative (rather than quantitative) sensitivity of each receptor, particularly their ability to respond to change;
- Magnitude of impact – considers the size of the impact on people or business in the context of the area in which the effect would be experienced; and
- Scope for adjustment– focussing on economies that adjust themselves continually to changes in supply and demand. The scope for the changes brought about by the Proposed Scheme to be accommodated by market adjustment would therefore be a criterion in assessing effect significance.

15.4.27. The assessment process aims to be objective and quantify effects as far as possible. However, many socio-economics effects can only be evaluated on a qualitative basis. Effects have been defined as follows:

- **Beneficial**: classifications of significance indicate an advantageous or beneficial effect on an effect area, which may be minor, moderate, or major in effect;
- **Adverse**: classifications of significance indicate a disadvantageous or adverse effect on an effect area, which may be minor, moderate or major in effect; and
- **Negligible**: classifications of significance indicate imperceptible effects on an effect area.

15.4.28. Based on consideration of the above, where an effect is assessed as being beneficial or adverse, the significance has been assigned using the scale below based on professional judgement:

- **Negligible**: No receptors (or very few) are affected. No discernible improvement or deterioration to the existing environment because of the Proposed Scheme will occur;
- **Minor**: The Proposed Scheme would cause a small improvement or deterioration to the existing environment;
- **Moderate**: The Proposed Scheme would cause a noticeable improvement or deterioration to the existing environment; and
- **Major**: The Proposed Scheme would cause a large improvement or deterioration to the existing environment.

15.4.29. The duration of effect is also considered, with more weight given to permanent changes than to temporary ones. Temporary effects are those associated with construction works. In accordance with **Chapter 4: EIA Methodology (Volume 1)**, the temporary construction effects would be short-term in nature because they are up to five years in length. Permanent effects are generally those associated with the completed development and are expected to be non-reversible.

15.4.30. Only Moderate and Major effects are significant in EIA terms.

15.5. STUDY AREA

15.5.1. In the absence of statutory guidance on socio-economics assessment, reference has been made to best practice guidance and professional judgement. Employment generation within Greater London and Outside Greater London has been estimated following guidance set out within the Employment Density Guide[10] and the Homes and Communities Agency's Additionality Guide[11].

15.5.2. The Study Area for socio-economics covers the area of economic impact of the Proposed Scheme. The Proposed Scheme is accessible from LBB, as well as areas of Greater London and is likely to be served by a labour force from across these geographies. Consequently, the local Study Area for socio-economics is LBB and the regional Study Area comprises Greater London. The Study Areas are shown in **Figure 15-1: Socio-economics Study Areas** (**Volume 2**). The anticipated employment generation of the Proposed Scheme is presented for Greater London (including LBB) and outside Greater London.

15.5.3. The Study Area for commercial businesses (terrestrial and marine) impacts are those located within the Site or with direct access within the Site because these are the businesses that would most likely be beneficially or adversely affected by the Proposed Scheme.

15.6. BASELINE CONDITIONS AND FUTURE BASELINE

Baseline

Economy and Employment

15.6.1. As set out in the Bexley Local Plan[5], Bexley expects to play an important role in London's future economy and making London a resilient city and build back better. According to NOMIS[b] data the proportion of individuals aged 16-64 estimated to be economically active in 2022 was 85.3% (138,900 people) in LBB, which is higher when compared with the London (79.8%) and Great Britain (78.5%) averages.

[b] NOMIS is the Office for National Statistics web-based database of census and labour market statistics.

15.6.2. The economic activity rate is a useful measure of the labour market opportunities available in the area. The economic activity rate measures the percentage of the population, both in employment and unemployed, that represent the labour supply regardless of their labour status. The figure represents the degree of success of the area in engaging people in productive activity.

15.6.3. As set out in **Table 15-4**, rates of economic activity in LBB are greater than rates within London and Great Britain as a whole.

Table 15-4: Economic Activity[15]

Economic Activity	LBB (%)	London (%)	Great Britain (%)
Economically Active	85.3	79.8	78.5
Economically Inactive	14.7	20.2	21.5

15.6.4. **Table 15-5** below presents an overview of economic activity within LBB and London, as compared with Great Britain as a whole. The data indicates that there is a higher proportion of people in employment in LBB compared to London and Great Britain, with lower levels of unemployment in LBB compared to London and Great Britain. Proportions of self-employed people in LBB and London are higher than Great Britain.

Table 15-5: Economic Activity by Type[15]

Type	LBB	London	Great Britain
Economically Active		(%)	
In Employment	83.4	76.2	75.6
Employees	70.5	64.3	66.0
Self Employed	12.9	11.6	9.3
Unemployed	2.7	4.4	3.6
Economically Inactive			
Student	21.4	32.7	26.3
Look after family/home	#	24.6	19.8
Temporary Sick	!	2.1	2.2
Long term sick	28.3	19.5	25.8
Discouraged	!	!	0.3
Retired	#	7.5	13.8
Other	#	13.6	11.7

Key:
 # Sample size too small for reliable estimate.
! Estimate is not available since sample size is disclosive on the NOMIS website.

15.6.5. In LBB, there were 74,000 jobs in 2021, 64.9% of which were full-time and 36.5% part-time[15]. The NOMIS Job Densities Report[15] is available on a local authority and sub-regional level and indicates the availability of employment and labour demand. In 2021, the job density levels (i.e., the ratio of total jobs to the population aged 16-64) was 0.56 in LBB, which was much lower than the London (1.02) and Great Britain (0.85) averages. This indicates that there are fewer job opportunities available in LBB when compared to London and Great Britain as a whole.

15.6.6. **Table 15-6** presents a breakdown of the occupational profile of employment within LBB, London and Great Britain. As shown in the table, the average proportion of employees across different industries in LBB is broadly in line with London and Great Britain. However, LBB has a noticeably higher proportion of people employed in Administrative Professional Occupations (13.2%) and Skilled Trade Occupations (10.4%).

Table 15-6: Occupational Profile[15]

Occupation	LBB	London	Great Britain
	(%)		
Managers, Directors and Senior Officials	12.7	12.0	10.4
Professional Occupations	26.1	34.4	26.2
Associate Professional Occupations	11.5	17.1	14.8
Administrative & Secretarial Occupations	13.2	9.0	10.0
Skilled Trades Occupations	10.4	6.0	8.7
Caring, Leisure and Other Service Occupations	5.4	6.6	8.0
Sales and Customer Service Occupations	6.9	5.0	6.4
Process Plant & Machine Operative	5.3	3.0	5.6
Elementary Occupations	7.9	6.5	9.5

15.6.7. **Table 15-7** details the employee jobs per industry sector in 2021. The highest proportion of employee jobs in LBB was in 'Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles' (Sector G) at 18.9%. The proportion of employee jobs in LBB in 'Construction' (Sector F) was higher (8.1%) than the London (3.5%) and Great Britain (4.9%) averages. Whilst the proportion of employee jobs in 'Financial and Insurance Activities' (Sector K) was lower (0.9%) than the London (8.0%) and Great Britain (3.6%) averages. This indicates that there are more manual jobs within LBB when compared to London and Great Britain.

Table 15-7: Overview of Employee Jobs by Industry Sector in 2021[15]

Industry sector	LBB	London	Great Britain
	(%)		
B: Mining and Quarrying	0.0	0.0	0.1
C: Manufacturing	6.1	2.1	7.6
D: Electricity, Gas, Steam and Air Conditioning Supply	0.4	0.4	0.4
E: Water Supply; Sewerage, Waste Management and Remediation Activities	0.9	0.3	0.7
F: Construction	8.1	3.5	4.9
G: Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	18.9	11.4	14.4
H: Transportation and Storage	6.1	4.3	5.1
I: Accommodation and Food Service Activities	6.1	7.4	7.5
J: Information and Communication	3.0	8.4	4.5
K: Financial and Insurance Activities	0.9	8.0	3.6
L: Real Estate Activities	2.7	2.5	1.8
M: Professional, Scientific and Technical Activities	6.1	14.2	8.9
N: Administrative and Support Service Activities	12.2	9.7	8.9
O: Public Administration and Defence; Compulsory Social Security	4.1	4.6	4.6
P: Education	9.5	7.3	8.8
Q: Human Health and Social Work Activities	10.8	10.6	13.7
R: Arts, Entertainment and Recreation	1.7	2.8	2.3
S: Other Service Activities	2.0	2.5	1.9

15.6.8. As detailed in the Bexley Growth Strategy[6], Belvedere is dominated by expansive low-level industrial and commercial sites, low-density housing and large scale transport infrastructure. As set out in the Bexley Local Plan[5], the Borough's employment land is mainly connected to traditional industrial activities, particularly in respect of some larger employment sites that help to facilitate the Borough's regional role in sectors like logistics, recycling and waste management, and also support niche strengths such as food processing.

15.6.9. **Table 15-8** details the qualifications of the resident population aged 16-64 in LBB, compared to London and Great Britain for January to December 2021. The proportion of people aged between 16-64 in LBB with no qualifications is higher than the London (5.5%) and Great Britain (6.6%) averages at 7.4%[15]. The achievement of degree level qualifications (NVQ4 and above) in LBB (42.4%) is somewhat lower than London(59.0%), but similar to Great Britain (43.6%)[15]. Overall, this suggests a slightly lower skilled workforce within LBB compared with London.

Table 15-8 Qualifications of Resident Population Aged 16-64 (Jan-Dec 2021)[15]

Qualifications	LBB	London	Great Britain
	(%)		
NVQ4 and above	42.4	59.0	43.6
NVQ3 and above	60.4	71.4	61.5
NVQ2 and above	77.4	81.5	78.1
NVQ1 and above	87.6	87.1	87.5
Other qualifications	5.0	7.4	5.9
No qualifications	7.4	5.5	6.6

Commercial Businesses

15.6.10. **Chapter 2: Site and Proposed Scheme Description (Volume 1)** and **Chapter 14: Population, Health and Land Use (Volume 1)** provides an overview of the commercial businesses (terrestrial and marine) located within, and in the area surrounding, the Site.

15.6.11. Of specific relevance to this chapter is Munster Joinery, located within the Site as shown in **Figure 1-2: Satellite Imagery of the Site Boundary (Volume 2)**. Munster Joinery is a window and door manufacturing company; with operations on Norman Road focussing on storage and the co-ordination of deliveries[21]**.** It is a tenant, with the freeholder of the land being Landsul Limited.

15.6.12. The Bexley Riverside Opportunity Area has been allocated within the London Plan[4] since 2004 with the potential for provision of 6,000 new homes and 19,000 new jobs by 2041. The detailed boundary of the Opportunity Area has not been defined at the time of writing. However, it is likely to fall within the local Study Area as detailed in the London Plan 2021 (paragraph 2.1.55)[4], where the Bexley Riverside Opportunity Area would stretch along the south side of the Thames and include the area of Belvedere. The Bexley Growth Strategy[6] shows that part of the Opportunity Area in Belvedere is located within the Site.

15.6.13. Immediately south of the Site is the Thamesmead and Abbey Wood Opportunity Area, the boundary of which has been defined. This area has the potential for 8,000 new homes and 4,000 new jobs by 2041.

15.6.14. The Proposed Scheme is located within the Belvedere Industrial Area, designated Strategic Industrial Location (SIL) in the London Plan[4,] and the Bexley Local Plan[5]. Hailey Road Industrial Estate, also a designated SIL, is located approximately 75m south of the Site Boundary. The London Plan (policy E5) states these sites are important locations that should be *"managed proactively [..] to sustain them as London's largest concentrations of industrial, logistics and related capacity for uses that support the functioning of London's economy*".

15.6.15. The effects on accessibility and viability of commercial businesses as a result of the Proposed Scheme has been reported in **Chapter 14: Population, Health and Land Use (Volume 1)** and, therefore, has not been considered further within this chapter.

Future Baseline

15.6.16. Existing commercial business within the Site would remain at their current locations should the Proposed Scheme not proceed. These include Riverside 1 (including Middleton Jetty) and Munster Joinery. Riverside 2 would also be operational in the future baseline.

15.6.17. It is anticipated that there would be changes to the distribution and structure of the population over time. In particular, the Bexley Riverside Opportunity Area is likely to bring additional housing and employment opportunities in Bexley. However, overall, the changes in the population and economy in Bexley and London are unlikely to change the outcomes of the assessment.

15.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

15.7.1. This section sets out the embedded design, mitigation and enhancement measures relevant to the socio-economics assessment.

Construction Phase

15.7.2. The embedded design, mitigation and enhancement measures for the construction phase are outlined below:

- The Applicant would seek to relocate the existing Munster Joinery, as set out in **Section 2.5** of **Chapter 2: Site and Proposed Scheme Description (Volume 1)**; and
- The Applicant would seek to recruit locally wherever practicable.

15.7.3. Although crime and safety has been scoped out of the EIA, the following mitigation measures would be implemented to ensure that significant impacts can be avoided:

- Site security arrangements will be in line with the Construction (Design and Management) Regulations 2015[22] where appropriate levels of security (staff/ CCTV) will be appointed, and fencing will be in place during the construction phase. Security arrangements will be referenced in the OCoCP**,** which will be prepared as part of the application for development consent.
- Consultation is likely to be undertaken with the Metropolitan Police Liaison Officer and PLA as part of the ongoing design development of the Proposed Scheme.
- Measures that relate to the construction activities in the River Thames prior to the commencement of construction are described in **Chapter 19: Marine Navigation (Volume 1)**.

Operation Phase

15.7.4. The embedded design, mitigation and enhancement measures for the operation phase are:

- The Applicant would seek to relocate the existing Munster Joinery, as set out in **Section 2.5** of **Chapter 2: Site and Proposed Scheme Description (Volume 1)**
- The Applicant would recruit locally, wherever practicable, and enable access to training and career development. A Skills and Employment Plan will be prepared prior to the Proposed Scheme commencing operation and secured by DCO Requirement.
- The processes used to recruit and manage staff to work at the Proposed Scheme would be demonstrably fair and offer equal opportunities to all.

15.7.5. The Applicant would continue to provide funding and support to activities relevant to the local community in Bexley, such as the Community Eco Challenge (part of the Bexley Eco-Fest) which offers prizes for the most engaging, innovative and inspiring eco-friendly upgrades people have made to their homes. Although crime and safety has been scoped out of the EIA, the following mitigation measures would be implemented to ensure that significant impacts can be avoided:

- Appropriate levels of security (staff/CCTV) will be implemented during the operation phase. These include controlled entry automated gate car park access barrier, lighting, and fencing and repairment. Security arrangements will be set out in an OEMP, which would be prepared prior to the Proposed Scheme commencing operation and secured by DCO Requirement.

15.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

15.8.1. This section details the preliminary assessment of impacts and effects for the Proposed Scheme during both the construction and operational phases, considering the embedded design, mitigation and enhancement measures detailed in **Section 15.7**.

15.8.2. The choice between demolition or retention of the Belvedere Power Station Jetty (disused) will not change the outcomes of the preliminary assessment of impacts and effects reported within this technical chapter. This is because the anticipated change in employment and GVA as a result of the demolition or retention of the jetty would not be large enough to change the outcomes or significance of the assessment in the context of the LBB and London labour pool and economy.

Construction Phase

15.8.3. The likely effects for socio-economics associated with the construction phase are set out below.

Construction Employment Generation

15.8.4. Construction employment represents a positive economic effect that can be estimated as a function of the scale and type of construction (infrastructure and buildings). The following section estimates gross employment arising from the Proposed Scheme during the construction phase and then considers leakage, displacement and multiplier effects to assess the net effects on construction employment for the Greater London economy.

15.8.5. As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, two options for the construction programme are being considered as part of the ongoing design development: Option 1 and Option 2. The estimated construction period is approximately 60 months (five years) for Option 1 and approximately 45 months (four years) for Option 2. The construction work is not permanent and therefore the effect will be temporary and short-term in nature. The capital and revenue expenditure involved in the construction period will lead to increased output in LBB, Greater London and the wider economy.

Gross Direct Construction Employment

15.8.6. Applying an average gross output per construction industry employee to the estimated total construction cost, as outlined in **Section 15.4**, it is therefore estimated that there are likely to be a total of:

- 138.3 Full Time Equivalent (FTE) gross construction employees per annum during the construction phase for Option 1. Of the 183.3 construction jobs, 103.7 jobs would be created within Greater London and 34.6 outside Greater London; and
- 184.4 FTE gross construction employees per annum for Option 2. Of the 184.4 construction jobs, 138.3 jobs would be created within Greater London and 46.1 outside Greater London.

Net Additional Construction Employment

15.8.7. **Table 15-9** presents the temporary employment generated by the Proposed Scheme for Option 1, taking leakage, displacement and multiplier effects into account. The total net additional employment created within Greater London as a result of the Proposed Scheme is estimated to be 132.3 employees per annum, whilst 44.1 jobs will be created outside of Greater London, resulting in a total net employment generation of 176.3 jobs on average per annum during the construction period.

Table 15-9: Option 1 Construction Employment Generation Per Annum

FTE Employment Generation	Greater London	Outside Greater London	Total
Gross Direct Employment	103.7	34.6	138.3
Displacement	-25.9	-8.6	-34.6
Net Direct Employment	77.8	25.9	103.7
Net Indirect and Induced Employment (including multiplier effects)	54.5	18.2	72.6
Total Net Additional Employment[c]	**132.3**	**44.1**	**176.3**

15.8.8. **Table 15-10** presents the temporary employment generated by the Proposed Scheme for Option 2, taking leakage, displacement and multiplier effects into account. The total net additional employment created within Greater London as a result of the Proposed Scheme is estimated to be 176.3 employees per annum, whilst 58.8 jobs will be created outside of Greater London, resulting in a total net employment generation of 235.1 jobs on average per annum during the construction period.

[c] In order to determine the total net employment, leakage, displacement, and multiplier effects are taken into account of the gross employment generated. Totals may not add up due to rounding.

Table 15-10: Option 2 Construction Employment Generation Per Annum

FTE Employment Generation	Greater London	Outside Greater London	Total
Gross Direct Employment	138.3	46.1	184.4
Displacement	-34.6	-11.5	-46.1
Net Direct Employment	103.7	34.6	138.3
Net Indirect and Induced Employment (including multiplier effects)	72.6	24.2	96.8
Total Net Additional Employment	**176.3**	**58.8**	**235.1**

15.8.9. The anticipated construction employment generation within Greater London includes the jobs that would be generated within LBB. The sensitivity of economic receptors at the local (LBB) and regional level (Greater London) is considered to be low due to the high rates of economic activity and high levels of employment in the area. The magnitude of impact is considered to be low at the local and regional level, given the anticipated number of construction jobs generated by the Proposed Scheme, in the context of LBB and Greater London labour pools. The location of the Proposed Scheme means that the majority of construction employees will likely be from the Greater London labour pool.

15.8.10. Therefore, the direct, indirect and induced employment, expenditure and upskilling created by the construction phase of the Proposed Scheme is likely to have a direct, temporary, short term **minor beneficial (not significant)** effect on LBB and Greater London economy.

Construction GVA

15.8.11. There are opportunities for local (LBB) and regional (Greater London) economic benefits arising from the construction phase. By applying an average benchmark of £108,841 GVA per construction employee in Greater London for both Option 1 and Option 2, it is anticipated that the estimated 132.3 (Option 1) or 176.3 (Option 2) net construction jobs generated by the Proposed Scheme represent an additional £14,399,664 (Option 1) or £19,188,668 (Option 2) in GVA to the Greater London economy.

15.8.12. By applying the average benchmark of £82,309 GVA per construction employee outside of Greater London to the estimated 44.1 (Option 1) or 58.8 (Option 2) net construction job generation from the Proposed Scheme, it is estimated that there would be an additional £3,629,827 (Option 1) or £4,839,769 (Option 2) GVA to the wider economy.

15.8.13. The anticipated construction employment generation within Greater London includes the jobs that would be generated within LBB. The sensitivity of economic receptors at the local (LBB and Greater London) levels is considered to be low due to the high rates of economic activity and high levels of employment in the area. The magnitude of impact is considered to be low at the local and regional level, given the anticipated GVA generated by the Proposed Scheme, in the context of the GVA generated in LBB and Greater London economy. In the context of the Greater London economy, the generation of GVA during the construction phase of the Proposed Scheme is likely to have a direct, temporary, short-term **minor beneficial (not significant)** effect on LBB and Greater London economy.

Operation Phase

15.8.14. The likely effects for socio-economics associated with the operation phase are set out below.

Operation Employment Generation

15.8.15. The Proposed Scheme will generate long-term jobs once it is complete and operational. In estimating operational job generation, it is important to consider not just the gross effects of the Proposed Scheme, but also the 'deadweight' associated with Munster Joinery and net effects, taking into account leakage, displacement and multiplier effects.

Gross Direct Operation Employment

15.8.16. The Applicant is seeking to provide a total of 5,261m^2 Gross Internal Area (GIA) employment floorspace for industrial and manufacturing activities. The employment density corresponding to this use is outlined in the Homes and Communities Agency (now known as Homes England) Employment Density Guide[10] and has been applied to calculate the projected gross number of employees.

15.8.17. When the Proposed Scheme is complete and operational, the employment floorspace onsite is estimated to support 146.1 gross jobs , as presented in **Table 15-11.**

Table 15-11: Gross Direct Operational Employment Generation

Use Class	Floorspace (m^2)	Employment Density (per m^2)	Gross Direct Employment
Industrial & Manufacturing	5,261	36	146.1

15.8.18. As detailed above, Munster Joinery will be demolished as part of the Proposed Scheme. As a relocation site for Munster Joinery has not been identified or secured at the time of writing, the potential job losses associated with the demolition of the joinery has been considered as 'deadweight'. The number of existing employees working at Munster Joinery has been calculated based on the Munster Joinery floorspace as a likely worst-case scenario should the joinery not be relocated. The employment density corresponding to this use is outlined in the Employment Density Guide[10] and has been applied in order to calculate the anticipated number of existing employees at Munster Joinery.

Table 15-12: Deadweight Employment Generation

Use Class	Floorspace (m^2)	Employment Density (per m^2)	Gross Direct Employment
Warehouse	3,510	70	50

15.8.19. As such, 50 FTE jobs have been considered as a net loss, or 'deadweight', when calculating total net employment generation. Of the 50 FTE jobs, it is anticipated that 38 would be from within Greater London and 13 would be from outside Greater London.

Net Additional Operation Employment

15.8.20. Assuming a leakage of 25% outside Greater London, a low level of displacement, a 1.7 multiplier and accounting for the net loss of jobs from Munster Joinery, it is estimated that the Proposed Scheme would result in the creation of 136.3 net additional jobs, of which 101.7 are estimated to be taken up by residents of Greater London, and 33.6 by residents outside Greater London (as shown in **Table 15-13**).

Table 15-13: Net Additional Operation Employment Generation

FTE Employment Generation	Greater London	Outside Greater London	Total
Gross Impact	109.6	36.5	146.1
Displacement	-27.4	-9.1	-36.5
Net Direct Employment	82.2	27.4	109.6
Net Indirect and Induced Employment	57.5	19.2	76.7
Deadweight	-38	-13	-50.0
Total Net Additional Employment	101.7	33.6	136.3

15.8.21. **Table 15-13** sets out the anticipated number of jobs generated based on the employment generating floorspace. The Applicant has also estimated the number of jobs that would be generated during the operation phase. As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** of the PEIR, the Applicant has estimated that the Proposed Scheme could support approximately 27 FTE jobs for operation and maintenance activities. It is anticipated that the floorspace of the Proposed Scheme would support a greater number of employees, as set out in **Table 15-13**, but certain roles associated with the functioning of the Proposed Scheme (e.g. administrative and other supporting functions) could be based in Riverside 1 and Riverside 2. When considering the 50 FTE jobs that could be lost if Munster Joinery was not relocated, there is the potential for a net loss of 23 FTE jobs overall. Therefore, the potential net loss of 23 FTE jobs presents a worst-case scenario in terms of employment generation as a result of the Proposed Scheme in comparison to the total net employment set out in **Table 15-13.**

15.8.22. The sensitivity of economic receptors at the local level (LBB) and regional level (Greater London) is considered to be low due to the high rates of economic activity and high levels of employment in the area. When considering the potential employment generation from the operational scheme in combination with the potential job losses from Munster Joinery, the magnitude of impact is considered to be negligible at the local and regional level. While there may be an overall net loss of jobs, this figure would be low and not give rise to any perceptible impact on the overall local and regional labour market. Therefore, it is assessed that the Proposed Scheme would likely have a direct, permanent, long-term **negligible (not significant)** effect on LBB and Greater London economy.

Operation GVA

15.8.23. When considering the net operation employment generation, as set out in **Table 15-13**, it is anticipated that the Proposed Scheme would represent an additional £6,135,866 GVA to the Greater London economy. This is calculated by applying an average benchmark of £60,333 GVA per operational employee in Greater London to the estimated 101.7 net operational jobs generated by the Proposed Scheme. When applying the average benchmark of £58,526 GVA per operational employee outside of Greater London, it is anticipated that the 33.6 net operational jobs would lead to an additional £1,966,474GVA to the wider economy.

15.8.24. However, in a worst-case scenario where the jobs at Munster Joinery would be considered as an overall net loss to employment the GVA generated would be limited.

15.8.25. The sensitivity of economic receptors at the local level (LBB) and regional level (Greater London) levels is considered to be low due to the high rates of economic activity and high levels of employment in the area. The magnitude of impact is considered to be negligible at the local and regional level, given the anticipated GVA generated by the Proposed Scheme, in the context of the GVA generated in LBB and Greater London economy. Overall, the generation of GVA during the operational phase of the Proposed Scheme is likely to have a direct, permanent, long term **negligible (not significant)** effect on LBB and Greater London economy.

15.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

15.9.1. As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** and **Section 15.7**, the Applicant is currently seeking to relocate the existing Munster Joinery. No further additional design, mitigation or enhancement measures are proposed for socio-economics.

15.10. MONITORING

15.10.1. No monitoring of socio-economics effects is considered to be proportionate or to be required.

15.11. RESIDUAL EFFECTS

15.11.1. **Table 15-14** below summarises the residual effects associated with the Proposed Scheme.

Table 15-14: Summary of Residual Effects

Description of the Impact	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual effect
Construction Phase				
Employment generation	Economic receptors	**Minor Beneficial (not significant)**	N/A	**Minor Beneficial (not significant)**
GVA Generation	Economic receptors	**Minor Beneficial (not significant)**	N/A	**Minor Beneficial (not significant)**
Operational Phase				
Employment Generation	Economic receptors	**Negligible (not significant)**	N/A	**Negligible (not significant)**
GVA Generation	Economic receptors	**Negligible (not significant)**	N/A	**Negligible (not significant)**

15.12. NEXT STEPS

15.12.1. Further work to be completed and included in the ES comprises:

- The socio-economics assessment will be further developed and refined based on any relevant responses to the Statutory Consultation; and
- The detailed assessment within the ES will involve a review of the socio-economics assessment presented in this chapter, based on further information as part of ongoing design development, particularly in relation to the relocation of Munster Joinery.

15.13. LIMITATIONS AND ASSUMPTIONS

15.13.1. The following limitations and assumptions have been identified:

- This assessment has been undertaken as a desk-based study, using publicly available information; and
- This assessment has relied, in part, on data provided by third parties (e.g., Ordnance Survey Mapping, Local Authorities, ONS) which are the most up-to-date data available at the time of writing. No significant changes or limitations in these datasets have been identified that would affect the robustness of the assessment.

15.14. REFERENCES

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DECARBONISATION

CHAPTER 16: MATERIALS AND WASTE

Cory Decarbonisation Project

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16. MATERIALS AND WASTE

16.1. INTRODUCTION

16.1.1. This chapter reports the preliminary assessment of the likely significant effects of the Proposed Scheme on materials consumption, waste generation and disposal, during construction and operation. It describes:

- relevant policy, legislation and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operational phase.

16.2. POLICY, LEGISLATION, AND GUIDANCE

16.2.1. The policy, legislation, and guidance relevant to the assessment of materials and waste for the Proposed Scheme is detailed in **Table 16-1**.

Table 16-1: Materials and Waste Summary of Key Policy, Legislation and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011[1]	Sets out the Government's policy for delivery of major energy infrastructure and is currently the primary basis for decision making of applications within the Planning Act 2008 regime. Section 5.14 outlines Government policy on hazardous and non-hazardous waste and sustainable waste management implemented through the waste hierarchy. The overall aim is to produce less waste by reusing it as a resource wherever possible, or to dispose of it in a way that is least damaging to the environment and human health. Paragraph 5.14.6 of NPS EN-1 refers to the specific requirement to prepare a Site Waste Management Plan (SWMP), which should include information on the proposed recovery and disposal of waste, along with an assessment of the impact of waste arising from the development on the capacity of waste management facilities in the area.

Policy, Legislation or Guidance	Description
Draft Overarching National Policy Statement (NPS) for Energy EN-1 2023[2]	This Draft Overarching National Policy Statement for Energy (EN-1) is part of a suite of draft NPSs issued by the Secretary of State of DESNZ. It sets out the government's policy for delivery of major energy infrastructure and will likely replace the 2011 NPSs by the time the application for the Proposed Scheme is submitted. In Section 5.15 Government policy on hazardous and non-hazardous waste management is outlined; this is intended to protect human health and the environment by producing less waste and by using it as a resource wherever possible. Applicants should ensure that through construction best practices, material is reused or recycled onsite where possible, or sourced from recycled or reused sources, and that low carbon materials, sustainable sources and local suppliers are used. Paragraph 5.15.9 of the policy makes reference to operational waste, noting that *"an assessment of the impact of the waste arising from development on the capacity of waste management facilities to deal with other waste arising in the area for at least five years of operation".* As part of the UK's commitment of moving towards a more 'circular economy' the policy notes at 5.15.12 that *"Construction best practices should be used to ensure that material is reused or recycled onsite where possible"*. This also includes taking measures to ensure adequate and suitable storage of materials. With regard to dredged material the policy states at 5.15.11 that *"If the applicant's assessment includes dredged material, the assessment should also include other uses of such material before disposal to sea, for example through reuse in the construction process".*
National Planning Policy Framework (NPPF) 2021[3]	The NPPF sets out the Government's planning policies for England and how these should be applied, with the following paragraphs relating to materials and waste. Paragraph 8 highlights that the purpose of the planning system is to contribute to the achievement of sustainable development through three overarching objectives: economic, social and environmental. The environmental objective requires the planning system to contribute and enhance the natural and local

Policy, Legislation or Guidance	Description
	environment by *"using natural resources prudently, minimising waste and pollution".* Paragraphs 209 to 214 outline the sustainable use of minerals, which are *"a finite natural resource and can only be worked where they are found"*. Therefore, it is essential that sufficient supply is maintained through various planning policies, including safeguarding mineral resources by defining Mineral Safeguarding Areas and Mineral Consultation Areas. Specific guidance under this framework (PPG) provides further information in support of the implementation of waste planning policy6.
The London Plan 2021[4]	The Spatial Development Strategy for Greater London sets out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policy SI 7: Reducing waste and supporting the circular economy of the London Plan is one of the key policies specific to Materials and Waste within Greater London, which states that: *"Resource conservation, waste reduction, increase in materials re-use and recycling, and reductions in waste going for disposal will be achieved by the Mayor, waste planning authorities and industry working in collaboration…"* Collaborative measures include promoting circular economy principles, encouraging waste minimisation and prevention, reusing materials, meeting or exceeding targets for construction and demolition (95% landfill avoidance), and designing adequate space to allow for separation of waste. Policy SI 8: Waste capacity and net waste self-sufficiency outlines policies to manage London's waste sustainably, through safeguarding existing waste management sites (Policy SI 9); optimising capacity at existing sites and enhancing waste and secondary materials management facilities at both existing and new sites. Policy SI 10: Aggregates states that *"An adequate supply of aggregates to support construction in London will be achieved by:*

Policy, Legislation or Guidance	Description
	• encouraging re-use and recycling of construction, demolition and excavation waste within London, including on-site • extracting land-won aggregates within London • importing aggregates to London by sustainable transport modes". Policy SI 10 also requires Mineral Planning Authorities to: • "identify mineral safeguarding areas to protect sand and gravel resources from development that would otherwise sterilise future potential extraction • identify and safeguard sites and facilities, including wharves and railheads, with existing, planned or potential capacity for transportation, distribution, processing and/or production of primary and/or secondary recycled aggregates".
The Bexley Local Plan 2023[5]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development across the Borough. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. The Local Plan addresses Materials and Waste through the following policies. Policy SP12: Sustainable waste management identifies that new developments will ensure that waste is managed to follow the principles of the circular economy by applying the waste hierarchy. Policy DP27: Minerals and aggregates sets out the importance of minerals and aggregates as a non-renewable resource. For non-mineral development, the policy states that *"Planning permission will not be granted for non-mineral development that would lead to the unnecessary sterilisation of mineral resources within a Minerals Safeguarding Area."* Exceptions would be considered where it can be demonstrated that the mineral is not of economic value or that the mineral reserves can be extracted prior to development. The policy also requires consideration of how the reuse and recycling of construction, demolition and excavation materials can be maximised onsite or if, this is not possible, in London.

Policy, Legislation or Guidance	Description
National Planning Policy for Waste 2014[6]	Outlines the Government's ambition to promote a sustainable approach to resource use and management. It sets out waste planning policies and should be read alongside: the NPPF; the National Waste Management Plan for England and any relevant successor policies, guidance or documents.
Waste Management Plan for England 2021[7]	Provides a detailed analysis of the present state of waste management at the national level and considers how the objectives of the Waste Framework Directive will be supported effectively. It outlines the waste hierarchy, which gives priority to waste prevention, followed by preparing for reuse, recycling, other types of recovery and finally disposal (e.g., landfill).
Our Waste, Our Resources: A Strategy for England 2018[8]	Sets out how the UK Government will preserve material resources by minimising waste, promoting resource efficiency and moving towards a circular economy. The Strategy also outlines the Government's aims to minimise the damage caused to the natural environment by reducing and managing waste safely and carefully, and by tackling waste crime. It combines actions to take now with firm commitments for the coming years and gives a clear longer-term policy direction in line with the 25 Year Environment Plan.
London Environment Strategy 2018[9]	The London Environment Strategy contains the following that specifically relates to Materials and Waste: Chapter 7: Waste sets out aims and objectives to plan for a circular economy by aiming to design out waste entirely.
Bexley's Environmental Sustainability Strategy 2011[10]	Bexley's Environmental Sustainability Strategy 2011 aims to achieve sustainable growth by 2025, including the preservation of the environmental character of the borough. Theme 7 – Waste Minimisation and Management is a key theme which outlines aims to manage waste through higher tiers of the waste hierarchy and working alongside other local boroughs to manage waste and share facilities.

Policy, Legislation or Guidance	Description
Southeast London Joint Waste Planning Technical Paper 2021[11]	This technical paper was prepared as evidence to demonstrate that each London borough's waste apportionment requirements, as set out in the London Plan 2021, can be met. This paper has been ratified by each member borough: Bexley, Bromley, Lewisham, Southwark, Greenwich and the City of London. The paper identifies safeguarded waste sites including Riverside 1 (referred to as the 'Riverside Resource Recovery Facility' in the technical paper).
London Borough of Barking and Dagenham Adopted Core Strategy (2010)[12]	This Strategy is considered relevant due to the Study Area proposed for the assessment (see **Section 16.5**). A key component of this Strategy is Policy CR3: Sustainable Waste Management, which outlines the borough's commitment to manage waste in a sustainable way and to help achieve national recycling and composting targets. The Strategy states that this will be achieved by considering landfill acceptable only as a last resort.
London Borough of Barking and Dagenham Local Plan (Emerging) 2022[13]	This forthcoming Local Plan is considered relevant to the Study Area proposed for the assessment (see **Section 16.5**). The Local Plan will set out the vision and framework for how Barking and Dagenham will be transformed to 2037. Once adopted, it will replace the Core Strategy for Barking and Dagenham. Policy DMSI 8 refers to demolition and construction wastes and expects development proposals to develop a construction waste management plan, and where appropriate, implement the principles in CL:AIRE The Definition of Waste: Development Industry Code of Practice[14] to avoid waste disposal to landfill and maximise reuse of waste. With regard to operational waste, Policy DMSI 8 requires all new development proposals to submit a strategy to minimise waste, provide sufficient storage for segregation, and, where hazardous waste is anticipated, ensure the risks to public safety and the environment are appropriately managed.
London Borough of Havering Local Plan 2016-2031[15]	This Local Plan is considered relevant to the Study Area proposed for the assessment (see **Section 16.5**). Policy 35 Waste management sets out criteria to consider when reviewing planning applications to ensure that

Policy, Legislation or Guidance	Description
	waste is managed sustainably, with emphasis on waste reduction and segregation. The Council follows the waste hierarchy approach and is committed to minimising the production of waste (through prevention) and then maximising the re-use and recycling or composting and minimising the use of landfill, with disposal seen as the final option. Policy 37 Mineral Reserves within this Local Plan sets out criteria to consider when reviewing planning applications to ensure that mineral reserves are managed sustainably. This includes designated Minerals Safeguarding Areas.
South East Inshore Marine Plan 2021[16]	The South East Inshore Marine Plan provides a framework that will shape and inform decisions over how the area's waters are developed, protected and improved over the next 20 years. Policy SE-DD-3 Dredging and Disposal refers to the disposal of dredged material, and that any proposals to do so must demonstrate that they comply with the waste hierarchy.
Legislation	
Environment Act 1995, as amended in 2021[17]	The Environment Act 1995 makes provision for targets, plans and policies for improving the natural environment. Sets out clear statutory targets for the protection and regeneration of the natural world in four priority areas, one of which is waste. Part 3 specifically refers to waste and resource efficiency, incorporating: producer responsibility obligations; resource efficiency; managing waste; and waste enforcement and regulation.
The Revised EU Waste Framework Directive 2008/98/EC[18]	Provides a comprehensive foundation for the management of waste across the European Community and gives a common definition of waste. While the UK is no longer a member of the European Union, many of the concepts underpinning the Directive are relevant to the UK's domestic law. Article 3 of the Waste Framework Directive defines waste as *"any substance or object that the holder discards or intends or is required to discard".*

Policy, Legislation or Guidance	Description
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020[19]	Makes provisions and amendments to other statutory instruments relating to waste regulations to ensure that environmental permitting and waste regimes continue to operate effectively, now that the UK has exited the EU.
The Environmental Permitting (England and Wales) Regulations 2016 (as amended)[20]	Aims to streamline the legislative system for industrial and waste installations into a single permitting structure for those activities which have the potential to cause harm to human health or the environment.
The Waste Electrical and Electronic Equipment Regulations 2013[21]	Aims to reduce the impact of electrical waste on the environment by encouraging reuse or recycling. Ensures electrical and electronic equipment is recycled in a sustainable way when it reaches end of life.
The Controlled Waste (England and Wales) Regulations 2012 (as amended)[22]	Classifies waste as household, industrial or commercial waste. It allows local authorities to implement charges for the collection of waste from non-domestic properties.
The Waste (England and Wales) Regulations 2011 (as amended)[23]	Stipulates the requirement for industry and businesses to implement the waste hierarchy. The Waste (England and Wales) (Amendment) Regulations 2014 amend the 2011 Regulations to clarify that the transfer of controlled waste can be recorded on alternative documentation, such as invoices, instead of waste transfer notes.
The Clean Neighbourhoods and Environment Act 2005[24]	Part 5, Chapter 3 of this Act specifically refers to site waste, where there may be a regulatory requirement to prepare SWMPs and to ensure compliance with them.
The Hazardous Waste (England and Wales) Regulations 2005[25]	Introduces measures to control storage, transport and disposal of hazardous waste. The Regulations provide a means to ensure that hazardous waste and any associated risks are appropriately managed.
The Waste Minimisation Act 1998[26]	Enables local planning authorities to take the appropriate steps to reduce and minimise the generation of household, commercial or industrial waste within their area.

Policy, Legislation or Guidance	Description
The Environmental Protection Act 1990[27]	As of 2008, defines within England, Scotland and Wales the fundamental structure and authority for waste management and control of emissions into the environment. The Act outlines the requirement of the manager of a development to ensure that any excess materials or waste resulting from construction activities are recovered or disposed of without any subsequent adverse effects upon the surrounding environment.
The Control of Pollution (Amendment) Act 1989[28]	The Control of Pollution (Amendment) Act 1989 makes it a criminal offence for a person who is not a registered carrier to transport controlled waste to or from any place in Great Britain. The Act also provides for the seizure and disposal of vehicles used for illegal waste disposal.
Guidance	
Planning Practice Guidance (2021)[29]	Explains the processes and tools that can be used through the planning system in England. • Minerals safeguarding: *"Since minerals are a non-renewable resource, minerals safeguarding is the process of ensuring that non-minerals development does not needlessly prevent the future extraction of mineral resources, of local and national importance".* The Guidance also outlines how planning authorities plan for mineral extraction and assess impacts from mineral extraction. • Waste: In order to protect human health and the local environment *"local planning authorities can ensure that waste is handled … through testing the suitability of proposed sites, both in developing their Local Plans and in considering individual planning applications, against the policies in paragraphs 4 to 7 and the factors in Appendix B of National planning policy for waste"*. The Guidance also outlines the principles of self-sufficiency and proximity (referred to as the 'proximity principle') that are set out in Article 16 of the Waste Framework Directive, whereby local planning authorities are required, under regulation 18 of the 2011 Regulations which transposed the Directive, to have regard to these requirements when exercising their planning functions relating to waste management.

Policy, Legislation or Guidance	Description
The Institute of Environmental Management and Assessment (IEMA) Guide to Materials and Waste in EIA[30]	Guidance used to assess the potential impacts and effects from the Proposed Scheme, using the process and significance criteria it sets out. This guidance is referred to as 'the IEMA Guide' throughout this chapter.
Waste Duty of Care: Code of Practice (2018)[31]	This Waste Duty of Care: Code of Practice (Defra, 2018) was issued under Section 34 of the Environmental Protection Act 1990 and sets detail on how to safely and responsibly manage wastes. The Code details the actions to be taken so to prevent unauthorised treatment or disposal of waste, ensure adequate storage to prevent uncontrolled escape of waste and to properly transfer wastes to third parties. Copies of waste transfer documentation must be retained for two years for non-hazardous waste, and three years for hazardous waste consignment notes.
British Standards Institution (2005) BS5906:2005 Waste management in buildings – Code of practice[32]	The Standard details the requirements for the safe storage, collection, segregation and onsite treatment for residential and non-residential developments. The standard requires designers to ensure safe and easy access to waste facilities which adhere to the aesthetics of the site whilst avoiding social nuisance. Facilities should support the waste hierarchy and be designed in consultation with service users.

16.3. SCOPING OPINION AND CONSULTATION

16.3.1. An EIA Scoping Opinion[33] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26 May 2023. The responses from the Planning Inspectorate in relation to materials and waste, and how any requirements are being addressed by the Applicant, are set out in **Table 16-2**.

Table 16-2: Summary of the EIA Scoping Opinion in Relation to Materials and Waste

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Planning Inspectorate			
3.12.1	Impacts associated with extraction of raw resources – construction and operation	*"The Inspectorate is in agreement that the nature of the Proposed Development means that it will not require the consumption of large quantities of raw materials during operation, and therefore this matter can be scoped out of the ES."*	No response required.
3.12.2	Consumption of material resources - operation	*"Based on the nature of the Proposed Development, the Inspectorate considers that the consumption of material resources has the potential to be significant, in particular the consumption of chemicals in relation to the removal of carbon from emissions (amine based solvents). No information is provided in relation to the anticipated volume of this material to be used, disposed and recycled, and the source of this material, for example UK manufacture, or imported from other countries.* *In addition, Chapter 12 of the Scoping Report (Greenhouse Gases) scopes in*	**Chapter 2: Site and Proposed Scheme Description (Volume 1)** describes the chemicals used in the Carbon Capture Facility and sets out that small volumes of amine-loaded sludge will be produced as a by-product of the carbon capture process. This will be temporarily stored onsite prior to being transported offsite to an appropriate waste treatment facility as hazardous waste. The volume of amine wastewater effluent will also be comparatively small; therefore, the waste will be disposed of by specialised contractors, taking the waste offsite for disposal via road tanker.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		emissions from operational activities including maintenance (category B2-B5). *The Inspectorate is therefore not in agreement that the consumption of material resources during operation can be scoped out of the assessment.* *It is noted that the consumption of water as a raw material is scoped into the Water Environment and Flood Risk ES Chapter and as such, is not required to be assessed within the Materials and Waste ES chapter."*	Chapter 16: Materials and Waste (Volume 1) of the ES will, where information is available, assess any potential significant effects from the consumption of amine-based solvents during the operational phase of the Proposed Scheme. **Chapter 11: Water Environment and Flood Risk (Volume 1)** of this PEIR and subsequently the ES will assess any potential significant effects on the consumption of water as a raw material. **Chapter 13: Greenhouse Gases (Volume 1)** of this PEIR and subsequently the ES will assess any potential significant effects from emissions from operational activities.
3.12.3	Operational waste arisings beyond the first year of operation	*"As the specific quantities and offsite reuse or disposal routes for operational wastes including Incinerator Bottom Ash, filter cake and amine wastes, is not known at present, the Inspectorate considers that there is insufficient evidence provided in order to justify scoping out operational waste arisings (especially as Chapter 19 of the Scoping Report notes that new hazardous*	A description of potential impacts arising from the reuse, recovery or disposal of operational waste will be provided in the ES where significant effects are likely to occur. By way of clarification though, the Proposed Scheme would not result in the generation of any Incinerator Bottom

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		wastes and materials will be stored on site). It is also not clear why the Scoping Report seeks to differentiate between the first year of operation and future operation beyond this, as no evidence is provided to determine why there would be separate waste streams or volumes. *Therefore, an assessment of the effects on the production and reuse/ disposal of operational waste is required to be scoped into the assessment for all operational years. The assessment should identify any implications for other relevant aspect chapters."*	Ash (IBA). The key waste 'products' will be filter cake and amine solvent wastes. It is assumed that due to the nature of the Proposed Scheme, the quantities of operational waste to be generated will be small. Notwithstanding this, the ES, where available, will provide an estimate of the quantities and categories of operational wastes generated by the Proposed Scheme per annum. Furthermore, an assessment into the treatment, reuse or disposal options for operational waste will be estimated for the operational phase of the development, including a sensitivity analysis upon local, regional and/or national treatment facilities, using the methodology described in **Section 16.4**. Where relevant, the implications for other assessments will be assessed in the relevant technical chapters of the ES, which is likely to include Chapter 13: Greenhouse Gases (Volume 1) and Chapter 18: Landside Transport.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.12.4	Transportation of material resources and waste – construction and operation	*"Based on the Scoping Report stating that the transportation of material resources and waste is to be assessed within the ES Chapters on Air Quality, Noise and Vibration, Greenhouse Gases and Landside Transport, the Inspectorate is in agreement that an assessment of transportation of material resources and waste can be scoped out of the Materials and Waste ES chapter.* *The Materials and Waste ES chapter should provide clear cross-referencing to where the relevant assessments are presented."*	Cross references are provided throughout this technical chapter and will be provided throughout the ES.
3.12.5	Contaminated arisings from construction and operation	*"Based on the Scoping Report stating that this matter is to be assessed within the Ground Conditions and Soils ES Chapter, the Inspectorate is in agreement that contaminated arisings can be scoped out of the Materials and Waste ES chapter."*	No response required.
3.12.6	Change in capacity	*"Table 15-7 of the Scoping Report omits a calculation of the volumetric change in capacity for hazardous merchant and restricted wastes, as both are listed as 0 (however a % is given). The presentation of*	The data has been amended in **Table 16-11** of this PEIR and will be used in the ES.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		data should be consistent within tables of the ES."	
3.12.7	Reuse of dredged material	*"Table 15-9 of the Scoping Report notes that a mitigation or design measure would include the use of a Materials Management Plan which is typically used for site won material. The Scoping Report refers to the potential reuse of dredged material from the River Thames on-site and if this option is pursued, the ES should identify any permissions or supporting assessments required to allow this (for example, CEFAS testing suites)."*	Material resource efficiency and waste minimisation measures, including the potential reuse of dredge material, will be included in the OCoCP. These measures will lead to the development of the (post-consent) Materials Management Plan (MMP). Cross reference will be made to Chapter 17: Ground Conditions (Volume 1) of the ES, where the Outline MMP and supporting assessments, where appropriate, will be discussed further. Any offsite disposal of material will be assessed in the relevant technical chapters of the ES likely to include Chapter 7: Marine Biodiversity (Volume 1) and Chapter 13: Greenhouse Gases (Volume 1).
3.12.8	Site Waste Management Plan	*"The Site Waste Management Plan should detail any opportunities to either reuse waste material onsite or reduce off site disposal by sending for processing (incineration, anaerobic digestion etc) in the*	An Outline Site Waste Management Plan (Outline SWMP) will be produced as an appendix to the ES. Within Chapter 16: Materials and Waste (Volume 1) of the ES, the anticipated

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		existing or under construction Riverside 1 and 2 facilities. *The ES should also specify where indicative waste streams and volumes are required to be processed off site (landfill, incineration or reuse etc) if they are not permitted to be processed at the facility, and why the wastes are required to be sent to a specific disposal route (for example, paragraph 15.7.2 indicates that filter cake will be sent to a hazardous landfill, whereas amine loaded wastes and hydrogen desiccant beds are to be incinerated off site).”*	quantities and disposal route (landfill, reuse, recycling) of waste streams will be identified. As described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer included in the scope of the Proposed Scheme.
Port of London Authority			
N/A	Materials and Waste	*The ES will need to demonstrate how the use of the river for the transportation of construction and waste materials will be maximised in line with planning policy.*	The proposed management of the use of the River Thames for the transportation of construction and waste materials will be presented in Chapter 2: Site and Proposed Scheme Description (Volume 1) of the ES.
	Materials and Waste	*Under the policy legislation and guidance section, the Marine Management Organisation (MMO) South East Marine Plan (2021) is referenced, including policy SE-DD03 on the disposal of dredge*	The South East Inshore Marine Plan[16] has been included in the relevant chapters of the of this PEIR and will also be included in the ES.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		material. Whilst this is welcomed this appears to be the only chapter where the South East Marine Plan is referenced – this requires review by the applicant as there are other policies (such as SE-BIO-1 on Biodiversity and SE-PS-1 on Ports and Shipping) within the Marine Plan which will also be relevant for the Proposed Scheme and must be considered.	
Environment Agency			
N/A	Environmental Permitting Regulations	*"The operation of the proposed facility may require a new environmental permit or a variation to an existing permit (EfW/AD) and added as a Directly Associated Activity (DAA)* *We would encourage early engagement with National Permitting Service so we can advise on what is needed for permit and licence applications. A good quality application is the best way of avoiding delay during determination. The developer can make the case for applications to be prioritised so that they are not on the permit queue. Technical assessment cannot be*	The Proposed Scheme will not be processing or handling waste therefore a variation to the existing permit for waste is not applicable. The requirements for monitoring pollutants resulting from the incineration of waste are set out in the environmental permits for Riverside 1 and Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken). The monitoring of pollutants introduced by the Carbon Capture Facility will be set within the environmental permit for the Proposed

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		expedited however so quality of application is key. *Note that we now assess the intake and discharge of biota as part of large scale abstractions from estuarine/sea water in terms of potential polluting effect. The abstraction licence would also cover possible impacts on species population".*	Scheme. Further detail is provided in **Chapter 5: Air Quality (Volume 1)**. **Chapter 11: Water Environment and Flood Risk (Volume 1)** (and subsequently the ES) considers potential effects on water quality.
N/A	Waste effluents.	*"We note the two proposed projects (carbon capture and hydrogen production) will produce waste effluent. It is assumed these will either be treated on-site and disposed of to foul sewer (under consent) or taken for treatment at an appropriately licensed facility. Any discharge to the environment would be subject to environmental permitting regulations. It may be beneficial to include waste effluents in Chapter 14 (Materials and Waste)".*	As described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer included in the scope of the Proposed Scheme. Operational Waste (including waste effluent (amine sludge)) has now been scoped in for assessment in Chapter 16 Materials and Waste (Volume 1) of the ES.
London Borough of Bexley			
N/A	General.	*"The Council is generally satisfied at the details submitted in this chapter and that the applicant has adequately addressed this issue at this stage".*	No response required.

16.3.3. Further to the EIA Scoping Opinion[33], consultation will be undertaken to seek agreement on the assessment approach presented within this technical chapter.

16.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

16.4.1. The materials and waste assessment of the Proposed Scheme in this chapter has been undertaken in line with the legislation, policy and guidance described in **Section 16.2**.

POTENTIAL SIGNIFICANT EFFECTS

16.4.2. As identified in the EIA Scoping Report[34], the following effects are considered to be significant and have been considered further in this assessment:

- Construction Phase:
  - consumption of material resources associated with the construction of the Proposed Scheme; and
  - disposal and recovery of waste associated with the construction of the Proposed Scheme.
- Operation Phase:
  - consumption of material resources associated with the Proposed Scheme during operation; and
  - disposal and recovery of waste associated with the Proposed Scheme during operation.

MATTERS SCOPED OUT

16.4.3. The following effects are considered unlikely to be significant, and therefore have not been considered further in this assessment:

- impacts associated with the extraction of raw resources and the manufacture of products;
- impacts from the transportation of material resources and waste to and from the Site; and
- impacts on human health and controlled waters as a result of contaminated site arisings from the Proposed Scheme.

16.4.4. As set out in **Table 16-2**, the Planning Inspectorate agrees that these effects would not likely be significant and, therefore, do not need to be considered further (see **Section 16.3** for details).

SENSITIVE RECEPTORS

16.4.5. The following sensitive receptors have been identified:

- **Material Resources** – consumption impacts on materials' immediate and long-term availability, which results in the permanent depletion of natural resources; and
- **Landfill Void Capacity** – reductions in regional and national infrastructure resulting in unsustainable use or loss of resources and temporary or permanent degradation of the natural environment.

BASELINE DATA COLLECTION

16.4.6. The most up-to-date sources of information, available at the time of writing, have been used to collate data for material resource availability, landfill capacity and waste recovery.

16.4.7. The key sources of information used to determine the baseline resource availability, landfill capacity and waste recovery conditions are:

- Department for Business and Trade Monthly Bulletin of Building Materials and Components[35];
- South East Aggregates Working Party Annual Report[36];
- London Aggregates Working Party Annual Report[37];
- Mineral Products Association Profile of the UK Mineral Products Industry[38];
- United Kingdom Steel Production Data[39];
- Greater London Authority The London Plan (2021)[4];
- Natural England MAGIC mapping[40];
- Basis of the UK BAP Target for the Reduction in use of Peat in Horticulture – SP0573 (2009)[41];
- Defra (2023) UK Statistics on Waste[42];
- Environment Agency Waste Data Interrogator[43]; and
- Environment Agency Remaining landfill capacity, England[44].

ASSESSMENT METHODOLOGY

Construction Phase

16.4.8. The IEMA Guide[30] has been used to assess the potential construction effects from the Proposed Scheme, using the process and significance criteria it sets out. Method W1 (Void Capacity, as detailed in the IEMA Guide) has been used to best reflect the scale and nature of the Proposed Scheme.

16.4.9. In accordance with the IEMA Guide[30], the assessment is a quantitative exercise that identifies the:

- type and volume of materials to be consumed by the Proposed Scheme during construction, including details of any recycled materials content;
- type and volume of waste to be generated by the Proposed Scheme during construction, with details of planned recovery and/or disposal method (for example onsite reuse, offsite recycling, disposal to landfill);
- cut and fill balance, during construction; and
- details of any construction materials to be specified, where sustainability credentials (particularly those that improve resource efficiency) afford performance beyond expected industry standards.

16.4.10. The sensitivity of materials relates to the regional (and where unavailable, national) availability and type of resources to be consumed by the Proposed Scheme. The sensitivity of waste relates to the availability of regional (and where appropriate, national) landfill void capacity, in the absence of the Proposed Scheme and future provision.

16.4.11. The magnitude of impacts from the Proposed Scheme that will be considered in the assessment include:

- anticipated reductions in availability (stocks, production or sales) of materials regionally and nationally; and
- anticipated reductions in the landfill void capacity of regional and national infrastructure.

16.4.12. The likely types and estimated quantities of material resources required for the Proposed Scheme (including arisings generated from the Site) have been assessed. Impacts are evaluated against regional (and where justified, national) materials availability data where information is obtainable.

16.4.13. The likely types and estimated quantities of waste to be generated by the Proposed Scheme have been assessed. Impacts are evaluated against the capacity of regional (and where appropriate, national) landfill infrastructure.

16.4.14. As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, two construction programme options are being considered. Both options have been considered within the construction phase assessment.

Operation Phase

16.4.15. The approach to assessing the effects of waste generated by the Proposed Scheme during its operational phase will essentially mirror the methodology adopted for the assessment of construction phase wastes. However, rather than the assessment solely relating to the ability of landfill infrastructure to accept any generated wastes, the assessment will also consider other recovery and disposal options for the more specialist types of waste to come from the operation phase of the Proposed Scheme. This is because unlike the construction phase, where associated waste, if not recycled, usually ends up in landfill, (e.g., surplus building materials) the types of waste to be generated during the operational phase such as solvent wastes and sludges, are more likely to require treatment at specialist facilities.

16.4.16. The operation phase assessment will be presented in the ES and will include:

- expected waste (composition and tonnages) to arise in a typical year of operation;
- changes to annual waste volumes from improvements or changes to operations e.g., replacement technologies, alterations in capacity of the facility etc; and
- changes to annual waste volumes from potential sustainability and waste reduction targets that could impact upon the composition, tonnage and management route for wastes (including internal targets or regulatory targets).

16.4.17. This information will be used to estimate operational waste arisings for the Proposed Scheme, including the likely type and quantity.

16.4.18. Impacts will be evaluated against the capacity of regional (and where appropriate, national) landfill and other final management infrastructure.

16.4.19. The operational waste arisings will not include end of life wastes such as the decommissioning and demolition of any facilities as set out in **Chapter 4: EIA Methodology (Volume 1)**.

Sensitivity Criteria

16.4.20. The criteria for assessing sensitivity of materials and waste receptors are set out in **Table 16-3**, in accordance with the criteria outlined in the IEMA Guide[30]. The sensitivity of materials is determined by identifying where one or more of the criteria thresholds are met. The sensitivity of waste is determined by considering the baseline and forecast future baseline of regional (or where justified, national) landfill void capacity.

Table 16-3: Materials and Waste Sensitivity Criteria

Sensitivity	Materials Criteria ***"On balance, the key materials required for the construction of the Proposed Scheme…***	Inert and Non-hazardous Waste Criteria ***Landfill Void or Other Final Management capacity is expected to…***	Hazardous Waste Criteria ***Landfill Void or Other Final Management capacity is expected to…***
Negligible	*…are forecast (through trend analysis and other information) to be free from known issues regarding supply and stock*; **and/or** *…are available comprising a very high proportion of sustainable features and benefits compared to industry-standard materials.**	*...remain unchanged or is expected to increase through a committed change in capacity.#*	*...remain unchanged or is expected to increase through a committed change in capacity.#*
Low	*…are forecast (through trend analysis and other information) to be generally free from known issues regarding supply and stock;* **and/or** *…are available comprising a high proportion of sustainable features and benefits compared to industry-standard materials.*	*...reduce minimally: by <1% as a result of wastes forecast.*	*...reduce minimally: by <0.1% as a result of wastes forecast.*
Medium	*…are forecast (through trend analysis and other information) to suffer from some potential issues regarding supply and stock;* **and/or**	*...reduce noticeably: by 1-5% as a result of wastes forecast.*	*...reduce noticeably: by 0.1-0.5% as a result of wastes forecast.*

Sensitivity	Materials Criteria ***"On balance, the key materials required for the construction of the Proposed Scheme…***	Inert and Non-hazardous Waste Criteria ***Landfill Void or Other Final Management capacity is expected to…***	Hazardous Waste Criteria ***Landfill Void or Other Final Management capacity is expected to…***
	…are available comprising some sustainable features and benefits compared to industry-standard materials.		
High	*…are forecast (through trend analysis and other information) to suffer from known issues regarding supply and stock*; **and/or** *…comprise little or no sustainable features and benefits compared to industry-standard materials*.	*...reduce considerably: by 6-10% as a result of wastes forecast.*	*...reduce considerably: by 0.5-1% as a result of wastes forecast.*
Very High	*…are known to be insufficient in terms of production, supply and/or stock;* ***and/or*** *…comprise no sustainable features and benefits compared to industry-standard materials.*	*... 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.*	*... 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."*
Notes	* Subject to supporting evidence, sustainable features and benefits could include, for example, materials or products that: • comprise reused, secondary or recycled content (including excavated and other arisings); or • support the drive to a circular economy; or • in some other way reduce lifetime environmental impacts. # By the relevant local planning authority.		

MAGNITUDE CRITERIA

16.4.21. **Table 16-4** sets out the criteria for assessing the magnitude of impact from materials and waste. For the purposes of this assessment, Method W1 (void capacity), as set out in the IEMA Guide[30] is used.

Table 16-4: Materials and Waste Magnitude Criteria

Magnitude	Materials Criteria *"The assessment of the Proposed Scheme is made by determining whether the consumption of…*	Inert and non-hazardous waste criteria *The percentage depletion of remaining landfill void or other final management capacity*	Hazardous waste criteria *The percentage depletion of remaining landfill void or other final management capacity*
No change	*...no materials are required.*	*Zero waste generation and disposal from the development.*	*Zero waste generation and disposal from development*
Negligible	*...no individual material type is equal to or greater than 1% by volume of the regional* baseline availability.*	*Waste generated by the development will reduce regional* landfill void or other final management capacity baseline[$] by <1%.*	*Waste generated by the development will reduce national landfill void or other final management capacity baseline[$] by <0.1%*
Minor	*...one or more materials is between 1-5% by volume of the regional* baseline availability.*	*Waste generated by the development will reduce regional* landfill void or other final management capacity baseline[$] by 1-5%.*	*Waste generated by the development will reduce national landfill void or other final management capacity baseline[$] by <0.1-0.5%*
Moderate	*...one or more materials is between 6-10% by volume of the regional* baseline availability.*	*Waste generated by the development will reduce regional* landfill void or other final management capacity baseline[$] by 6-10%.*	*Waste generated by the development will reduce national landfill void or other final management capacity baseline[$] by <0.5-1%*

Magnitude	Materials Criteria ***"The assessment of the Proposed Scheme is made by determining whether the consumption of…***	Inert and non-hazardous waste criteria ***The percentage depletion of remaining landfill void or other final management capacity***	Hazardous waste criteria ***The percentage depletion of remaining landfill void or other final management capacity***
Major	*...one or more materials is >10% by volume of the regional* baseline availability.*	*Waste generated by the development will reduce regional* landfill void or other final management capacity baseline$ by >10%.*	*Waste generated by the development will reduce national landfill void or other final management capacity baseline$ by >1%"*
Notes	* Or where justified, national. $ Forecast as the worst-case scenario during a defined construction phase.		

SIGNIFICANCE CRITERIA

16.4.22. The overall significance of effects from materials and waste are determined in accordance with the IEMA Guide (Section 11)[30], by comparing sensitivity and magnitude within the matrix provided in **Table 16-5**. Effects that are classified as moderate or above are considered to be significant.

Table 16-5: Matrix to Assign Significance of Effect Category for Materials and Waste

		Sensitivity of Receptor				
		Negligible	**Low**	**Medium**	**High**	**Very high**
Magnitude of Impact		Neutral	Neutral	Neutral	Neutral	Neutral
	Negligible	Neutral	Neutral or slight	Neutral or slight	Slight	Slight
	Minor	Neutral or slight	Neutral or slight	Slight	Slight or moderate	Moderate or large
	Moderate	Neutral or slight	Slight	Moderate	Moderate or large	Large or very large
	Major	Slight	Slight or moderate	Moderate or large	Large or very large	Very large

16.5. STUDY AREA

16.5.1. The Study Areas applicable to the Proposed Scheme during construction and operation are as defined in the IEMA Guide[30]:

- Development Study Area comprises the extent of the Site Boundary (see **Figure 1-1: Site Boundary Location Plan (Volume 2)**); and
- Expansive Study Area extends to the availability of construction materials and the capacity of waste management facilities within the London and the South East regions and the UK (a national study areas is used where regional data is unavailable).

16.6. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

16.6.1. A short summary of the baseline conditions for materials, site arisings and waste are presented in this section. The baseline conditions align with the Study Areas defined in **Section 16.5**.

Materials

16.6.2. The baseline for materials consumption:

- is determined by the materials currently required for the existing land use and assets; and
- provides regional and national information and data for material resource availability, in terms of construction materials typically required for developments of a similar scale and nature of the Proposed Scheme.

Materials Required

16.6.3. The operation and maintenance of all facilities located within the Site will require several minor products e.g., lighting, paint, fencing, as well as the intermittent use of bulk products for routine works and repairs of the existing buildings, plant, and access roads where not part of the public highway (concrete, masonry, aggregate and asphalt for minor re-surfacing). Riverside 2 is currently under construction, the availability of materials required for this development has inherently been captured within the baseline information presented in this chapter. Riverside 2 is expected to be completed prior to commencing the Proposed Scheme.

16.6.4. Although at the time of writing no specific data are available on materials currently required, professional judgement can be used to assert that by comparison with regional and national availability of resources, consumption of construction and other materials for routine maintenance by the current assets at the site is minimal. It is anticipated that this data will be available to inform the ES.

Construction Material Availability

16.6.5. A summary of the availability of the main construction materials in London and the South East of England (Berkshire, Buckinghamshire, East Sussex, Hampshire, Isle of Wight, Kent, Oxfordshire, Surrey and West Sussex) and the UK[35] [36] [37] [38] [39] is presented in **Table 16-6**. The overview excludes technological products but provides a context in which the assessment for material consumption during construction of the Proposed Scheme has been undertaken. Data are available for various years from 2018 to 2022; the most recent information has been presented.

Table 16-6: Construction Materials Availability in London and the South East and the UK

Material Type	London and South East	UK
Sand and Gravel*	16.1 (Mt) (2019)	60.2 Mt (2021)
Permitted Crushed Rock*	0.0 Mt (2019)	116.5 Mt (GB) (2019)
Concrete Blocks#	1.1 (Mm^2) (Southern England) (2022)	6.2 Mm^2 (2021)
Primary Aggregate*	16.1 (2019) (South East, no data for London)	198.8 Mt (2019)
Recycled and Secondary Aggregate*	4.5 Mt (2018)	71.0 Mt (2018) (GB)
Ready-mix Concrete*	5.5 (Mm^3) (2019)	24.7 Mm^3 (2019)
Steel+	No data.	7.2 Mt (2021)
Asphalt*	4.6 Mt (2019)	27.4 Mt (2019)
* sales # stocks + production Mt million tonnes Mm^2 million square metres Mm^3 million cubic metres GB: Great Britain (England, Wales and Scotland) figures used where UK figures (including Northern Ireland) are unavailable. Note: for concrete blocks, the information is only available for Southern England (not the London and the South East regions).		

16.6.6. Further analysis of the data suggests that across the UK, the availability of construction materials typically required for development in terms of stocks, production or sales remains buoyant, although information on steel production is not currently available at a regional level. Future trends are not available for scrutiny, and at the time of publication, it is noted that there may be short-term fluctuations in supply.

16.6.7. Where data are available, London and the South East has, in general a higher than average availability of some construction materials by comparison with other UK regions. For example, stocks of asphalt and primary aggregate (in particular sand and gravel) are amongst the highest in the UK. The availability (sales) of concrete blocks is, however, lower than the UK average; there are no sales from permitted crushed rock facilities in London and the South East.

16.6.8. There are no identified Minerals Safeguarding Areas[13], no known peat resources[40] or active peat extractions[41] within the Site.

Substances Material Availability (Chemicals)

16.6.9. Baseline data on the production of amine-based solvents in the UK is not available at the time of writing. However, the presence of major amine manufacturing suppliers in the UK and increasing global manufacturing and supply for amines (given the recognised policy need for carbon capture to be rolled out at scale), can be used to assert that these resources are widely available and unlikely to have any supply issues.

Site Arisings

16.6.10. The baseline for site arisings:

- is determined by the resources and waste generated through excavation, construction, demolition and other activities on the existing land use and assets; and
- provides regional and national information and data for existing transfer, recovery and recycling waste management facilities.

Site Arisings Generated

16.6.11. The current land uses within the Site are expected to generate minimal volumes of site arisings, limited to waste and surplus materials produced from the operation and maintenance of: Riverside 1 (including the Middleton Jetty, but not including the residual wastes received for recovery at the facility); Crossness LNR; Munster Joinery; and Norman Road. These arisings are expected to comprise municipal and maintenance (construction, demolition and excavation (CD&E)) waste types. Some of these arisings would be expected to be diverted from landfill. Further information on the UK and regional CD&E baseline is provided below.

16.6.12. At the time of writing, construction works for Riverside 2 are being undertaken. Arisings generated through on-going maintenance of the existing infrastructure within the Site is anticipated to be minimal in the context of regional landfill void capacity, based on the information presented in the ES and supporting documents for Riverside 2, specifically the CoCP. [reference 19/00998/ALA05]

16.6.13. Municipal and operational waste is currently (for Riverside 1 and will be for Riverside 2) managed by permitted operations (as issued by the Environment Agency) for the treatment of residual (non-recyclable) waste.

CD&E Waste Management: UK and Regional Perspective

16.6.14. Defra data, summarised in **Table 16-7,** shows that within England the recovery rate for non-hazardous construction and demolition wastes (excluding excavation wastes) has remained above 90% since 2010[42]. This exceeds the EU target of 70% (by weight) which the UK needed to meet by 2020. This target excluded naturally occurring materials, specifically category 17 05 04 in the list of wastes, defined as non-hazardous soils and stones[18].

Table 16-7: Non-hazardous Construction and Demolition Waste Recovery in England

Year	Generation (Mt)	Recovery (Mt)	Recovery rate (%)
2010	53.6	49.4	92.2
2011	54.9	50.8	92.5
2012	50.5	46.4	92.0
2013	51.7	47.6	92.0
2014	55.9	51.7	92.4
2015	57.7	53.3	92.3
2016	59.6	55.0	92.1
2017	62.2	57.9	93.1
2018	61.4	57.5	93.8
2019	62.3	58.3	93.6
2020	53.6	50.0	93.2

Source: Defra (2023) UK Statistics on Waste[42].

Note: Defra's 2023 update of the data in this table did not extend the data range beyond 2020.

16.6.15. Data in **Figure 16-1** has been collated to show that trends for transfer and materials recovery in London and the South East have risen steadily over the past 21 years[43]. Metal recycling has remained relatively consistent since 2014. Data are provided for all waste types and hence will include, but are not specific to, construction and demolition waste.

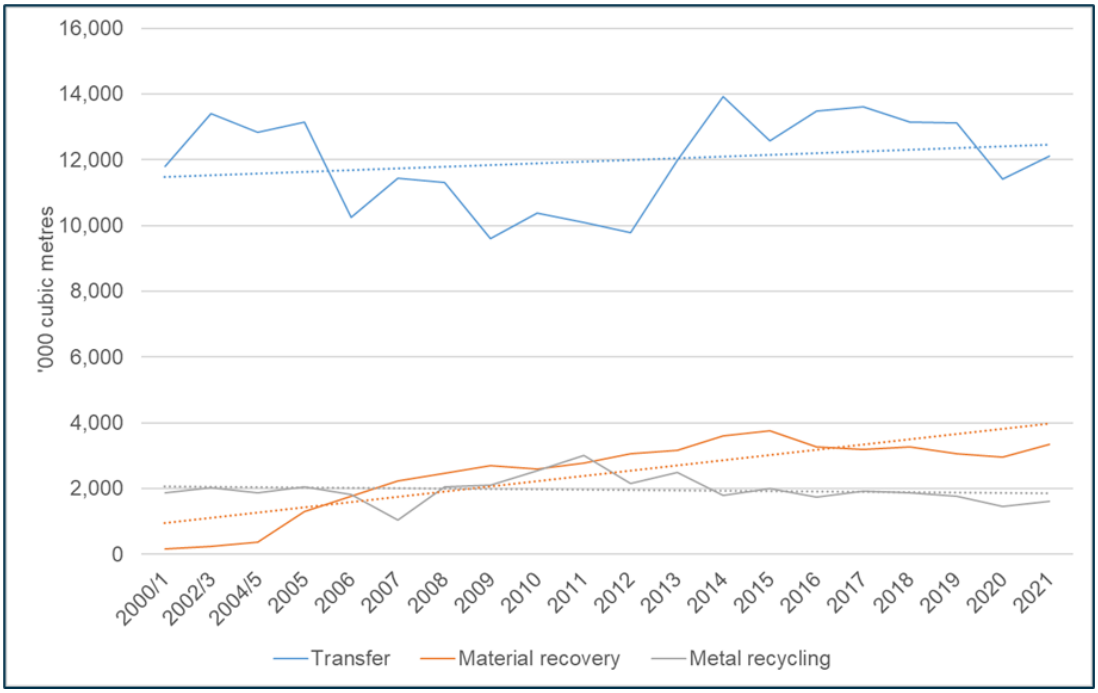

Figure 16-1: Transfer, Materials Recovery and Metal Recycling in London and South East (2000/1 – 2021)

16.6.16. Linear trends (shown as dashed lines in **Figure 16-1**) for transfer, recovery and metal recycling in London and the South East and the data[43] in **Table 16-8** indicate that there is waste management infrastructure available to divert from landfill CD&E wastes generated by the Proposed Scheme.

Table 16-8: Permitted Waste Recovery Sites in London and South East (2021)

Waste Recovery Facility Type	Number of Sites
Incineration	40
Transfer	618
Treatment	633
Metal Recovery	261
Use of Waste	1
Total	**1,553**

16.6.17. Regional data for construction and demolition waste management are presented in **Figure 16-2** and **Figure 16-3**. Information has been derived from an analysis of publicly available information in the Waste Data Interrogator[43].

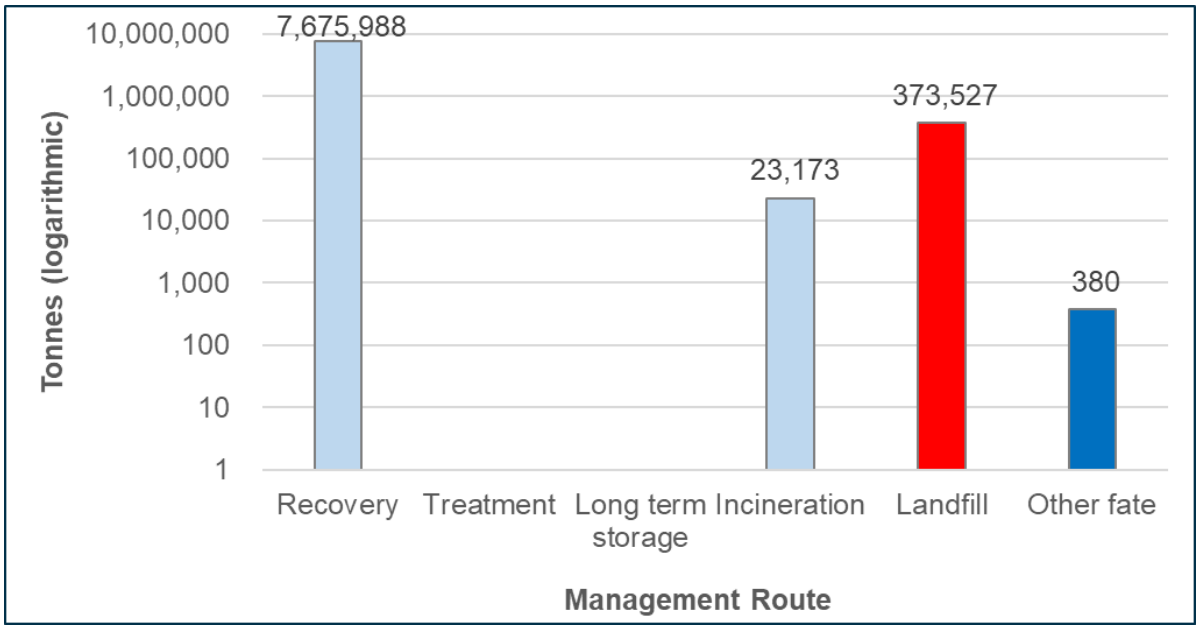

Figure 16-2: London Construction and Demolition Waste Management

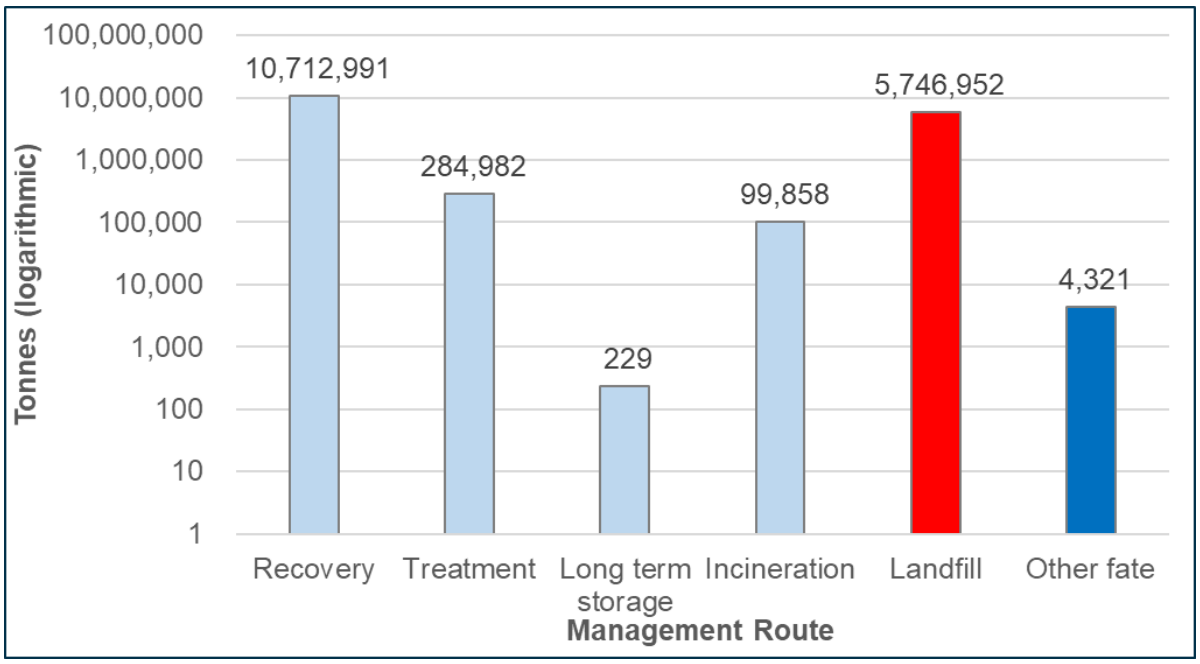

Figure 16-3: South East Construction and Demolition Waste Management Route

16.6.18. Environment Agency data in **Figure 16-2** and **Figure 16-3**[43] show that the volume of waste recovered, including treatment and incineration, was more than twenty times the volume of waste sent to landfill in the London region in 2021; while in the South East region recovered waste was more than double the volume of landfilled waste in the same period.

16.6.19. These findings are supported by data[43] provided in **Table 16-9** and **Table 16-10** which show that, in 2021, 95% (London) and 66% (South East) of waste received was diverted from landfill through waste management and recovery methods. Data includes the total waste received from both within the London and South East regions and from other regions in the UK. Waste generated within the London or the South East regions may have travelled into each other for management, or to other regions.

Table 16-9: London Waste Management Routes (2021)

Waste Management Route	Inert* and Non-Hazardous^ Waste (tonnes)	Hazardous Waste# (tonnes)	Total Waste (tonnes)	Percentage (%)
Recovery	7,553,102	146,059	7,699,161	95
Landfill	373,450	77	373,527	5
Other Fate	380	-	380	0
Total	**7,926,932**	**146,136**	**8,073,068**	**100**

* Inert waste is defined as waste:

- that does not undergo any significant physical, chemical or biological transformations;
- that does not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter from which it comes into contact in a way likely to give rise to environmental pollution or harm to human health; and
- where its total leachability and pollutant content and the ecotoxicity of its leachate are insignificant and, in particular, do not endanger the quality of any surface water or groundwater (see Directive 1993/31/EC 'The Landfill Directive').

Hazardous waste describes any waste that displays one or more of the hazardous properties listed in Annex III of the Waste Directive (2008/98/EC)[18].

^ Non-hazardous waste describes waste that is neither classified as inert nor hazardous.

Table 16-10: South East Waste Management Routes (2021)

Waste Management Route	Inert and Non-Hazardous Waste (tonnes)	Hazardous Waste (tonnes)	Total Waste (tonnes)	Percentage (%)
Recovery	11,079,013	19,048	11,098,060	66
Landfill	5,708,294	38,658	5,746,952	34
Other Fate	4,321	-	4,321	0
Total	**16,791,628**	**57,706**	**16,849,333**	**100**

16.6.20. The data presented in this section indicate the availability of waste management facilities in the region that are expected to enable appropriate recovery of site arisings generated by the Proposed Scheme. Furthermore, London Plan policy SI 8 [4] promotes capacity increases at waste management facilities where appropriate to maximise their use.

16.6.21. The London Plan[4] establishes CD&E waste and material recovery targets, including to achieve 95% reuse/recycling/recovery of construction and demolition waste, and 95% beneficial use of excavation waste within the 20 to 25-year timeframe of the Plan.

16.6.22. The availability of materials recovery infrastructure in London and the South East (mindful of the financial and environmental benefits that can be achieved by applying the proximity principle) suggests that there is good potential to divert site arisings generated by the Proposed Scheme from disposal to landfill.

Waste

16.6.23. The baseline for waste:

- is determined by the waste generated and disposed of by the existing land use and current assets; and
- provides regional and national information and data for landfill capacity currently available.

Waste Generated and Disposed

16.6.24. Commercial and industrial (C&I) waste is generated by business and industrial activity and will therefore occur relatively widely within the region (Expansive Study Area), with a particular concentration in more urbanised areas. Certain elements of the C&I waste stream, such as mixed ordinary C&I waste, can be very similar to household waste and can often be dealt with through similar treatment and disposal processes. C&I waste can also contain hazardous substances which require management at specialist facilities.

16.6.25. Information on C&I waste generation in England is currently provided in the UK Statistics on Waste report[42]. Whilst this report does not provide a regional breakdown of C&I arisings, it estimates that approximately 33.9 million tonnes of C&I waste was generated in England in 2021. C&I waste accounted for 19% of total waste generation in the UK in 2018.

16.6.26. The London Plan[4] states that 5.0m tonnes of C&I waste was produced in London in 2015.

16.6.27. C&I waste is currently collected within the Expansive Study Area by a large number of private waste companies. There is also a considerable network of waste facilities that are used to bulk, transfer, treat and dispose of C&I waste, including the Applicant's river-based transfer and recycling facilities and Riverside 1 and Riverside 2 once operational.

16.6.28. Although there is no quantified data relating to waste generated for disposal to landfill from activities undertaken on the current site, minimal waste is expected to comprise a combination of recoverable and non-recoverable wastes from C&I activities associated with Munster Joinery and Riverside 1; their office and welfare building(s); and routine maintenance.

Remaining Landfill Capacity

16.6.29. At the end of 2021, 56 landfill sites in London and the South East were recorded as having 57 Mm^3 of remaining capacity; these data are presented in **Table 16-11**[44].

Table 16-11: Remaining Landfill Capacity in London and South East (2020-2021)

Landfill Type	Capacity in 2020 (m^3)	Remaining Capacity in 2021 (m^3)	2020 to 2021 Change in Capacity (Mm^3) and Percentage
Hazardous (merchant)	146,325	121,318	(0.025) -17.1%
Hazardous (restricted*)	117,042	98,187	(0.018) -16.1%
Inert	27,751,909	21,820,265	(-5.9) -21.4%
Non-hazardous (including stable hazardous waste cells)	39,868,649	35,476,911	(-4.4) -11%
Total	**67,883,925**	**57,516,681**	**(-10.4) -15.3%**
*Restricted landfill sites only accept waste from restricted sources and producers, e.g., site operator/managing site.			

16.6.30. The London Plan[4] advises that for any waste intended to be disposed of to landfill, it is important to provide evidence that the receiving facility has capacity to accept waste over the lifetime of a given development.

16.6.31. The London Plan also states that no further landfill proposals are identified or anticipated within the Plan period (20-25 years); if proposals do come forward, for new or extended landfill capacity, or for land-raising, boroughs should ensure that the resultant void-space has regard to the London Environment Strategy[9].

16.6.32. Baseline regional landfill capacity[44] is detailed in **Figure 16-4**. Statistical forecasting has been used to demonstrate, in the absence of further provision, long-term void availability beyond the earliest operational date for the Proposed Scheme (see **Chapter 2: Site and Proposed Scheme Description (Volume 1)** for the construction phase).

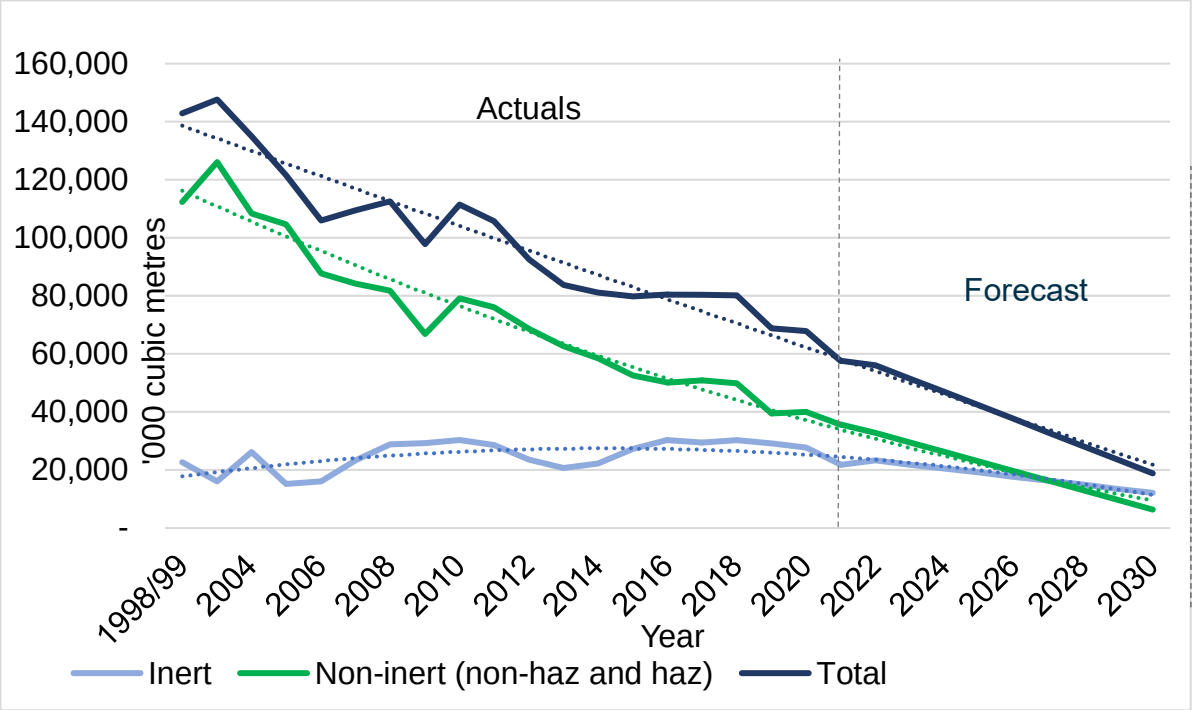

Figure 16-4: Remaining Landfill Capacity in London and South East England

16.6.33. Baseline data indicates that inert, non-inert and total landfill capacity is likely to become an increasingly sensitive receptor throughout the duration of the construction phase and in operation. **Figure 16-4** shows that in the absence of future provision, waste capacity in London and the South East is forecast to reduce from 2021 to 2030 by as much as:

- **Inert Waste:** 44% to 12.1 Mm^3;
- **Non-inert Waste (non-hazardous and hazardous):** 82% to 6.3 Mm^3; and
- **Total Waste:** 67% to 18.8 Mm^3.

16.6.34. Further to the data provided in **Table 16-11**, and to comply with the assessment criteria requirements of the IEMA Guide[30], hazardous waste data is presented in **Table 16-12**confirming that at the end of 2021, England had 12.1Mm^3 of remaining

merchant landfill capacity (i.e. capacity that is open to the market) for hazardous waste[44].

Table 16-12: Remaining Hazardous Waste Landfill Capacity in England

Landfill Type	Remaining Capacity in 2021 (Mm^3)
Hazardous Merchant	12.1
Hazardous Restricted*	2.1
Total Hazardous	14.2
*Restricted landfill sites only accept waste from restricted sources and producers, e.g., site operator/managing site.	

FUTURE BASELINE

16.6.35. Existing commercial business within the Site would remain at their current locations should the Proposed Scheme not proceed. These include Riverside 1, including Middleton Jetty and Munster Joinery. Riverside 2 would also be operational in the future baseline.

16.6.36. In the future baseline (in the absence of the Proposed Scheme) it is considered that the current land use within the Site would be influenced by the operation of Riverside 2, which is currently under construction. The ES for Riverside 2[45] concluded that there would be no significant effects for materials and waste from the construction or operation of this facility. Consequently, no significant changes to the baseline for materials and waste are anticipated in the future as a result of Riverside 2.

16.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

16.7.1. This section sets out the embedded design, mitigation and enhancement measures which are relevant to the materials and waste assessment.

CONSTRUCTION PHASE

- The Applicant would seek to relocate the existing Munster Joinery, as set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.
- Excavated arisings will be reused on the Proposed Scheme where suitable. If not suitable, it will be taken offsite for reuse, unless circumstances dictate it must be disposed to landfill.
- As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1),** dredged arisings will be managed in accordance with relevant legislation and these may be disposed of offsite (via road or to an offshore location) if deemed unsuitable for reuse. It is anticipated that the disposal method of dredged arisings shall be described and assessed within the ES.
- All surplus steel used for reinforcement (rebar) and sheet piling during construction will be taken offsite for recycling.

- Steel framework from the demolition of the Munster Joinery building may be suitable for reuse on the Proposed Scheme. If not suitable, it will be taken offsite for recycling.
- Profiled metal sheeting (from the walls and roof) and glass (windows) of the Munster Joinery building are not suitable for reuse on the Proposed Scheme, therefore these items will be taken offsite for recycling.
- The concrete yard slab will be lifted and crushed onsite for reuse; any metal rebar will be removed and taken offsite for recycling.
- The drainage pipework is not suitable for reuse on the Proposed Scheme and will be taken offsite for recycling, unless circumstances dictate it must be disposed to landfill.
- Existing palisade fencing will be retained onsite during the construction phase and the potential to align new fencing to this existing fencing is currently being explored. Any fencing that is to be removed will be taken offsite for recycling.
- The electronic gate will be retained onsite for the duration of the construction phase. This may be retained onsite following construction if suitable to meet security requirements.
- Existing galvanised steel wheel guides and ram protection bollards will be removed and taken offsite for recycling.
- An Outline SWMP will be prepared as part of the application for development consent.
- A MMP will be prepared prior to construction commencing (post-consent).
- The environmental mitigation required during construction will be recorded in the OCoCP, which will be submitted as part of the application for development consent.

OPERATION PHASE

16.7.2. These measures will be set out in the ES and the operational procedures, including maintenance, will be set out in an OEMP, which will be prepared prior to the Proposed Scheme commencing operation.

16.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

16.8.1. This Section details the preliminary assessment of impacts and effects for the Proposed Scheme during both the construction and operation phases, considering the embedded design, mitigation and enhancement measures detailed in **Section 16.7**.

16.8.2. The choice between demolition or retention of the Belvedere Power Station Jetty (disused) will not change the preliminary assessment of impacts and effects reported within this technical chapter as the effects of demolition of the jetty are included in the Materials and Waste assessment. Should the disused jetty be retained, the quantity of potential waste would reduce, therefore reducing the extent of the adverse waste effects reported in this technical chapter, although this will be assessed and confirmed in the ES.

ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

Construction Phase

16.8.3. The likely significant effects for Materials and Waste associated with the construction phase are set out below.

Consumption of Material Resources

16.8.4. The potential impacts associated with material consumption and waste generation and disposal during construction are summarised in **Table 16-13**.

16.8.5. Indirect impacts have been assessed in the following chapters: **Chapter 6: Noise and Vibration (Volume 1)**; **Chapter 7: Terrestrial Biodiversity (Volume 1)**; **Chapter 10: Townscape and Visual (Volume 1)**; **Chapter 12: Climate Resilience (Volume 1)**; **Chapter 13: Greenhouse Gases (Volume 1)**; **Chapter 14: Population, Health and Land Use (Volume 1)**; **Chapter 17: Ground Conditions and Soils (Volume 1); Chapter 18: Landside Transport (Volume 1)** and **Chapter 19: Marine Navigation (Volume 1)**.

Table 16-13: Potential Environmental Impacts

Element	Direct Impacts	Indirect Impacts
Materials	Consumption of natural and non-renewable resources.	• Release of greenhouse gas emissions (through transportation). • Water consumption. • Visual impacts, noise, vibration and other nuisance issues. • Human health.
Waste	Reduction in landfill capacity.	• Release of greenhouse gas emissions (through transportation and management). • Ecological impacts. • Visual impacts, noise vibration and other nuisance issues.

16.8.6. Key construction materials required for the Proposed Scheme are presented in **Table 16-14**.The data were provided in a preliminary Bill of Quantities (BoQ) by the Design Team in June 2023 and quantities have been rounded up to the nearest 10 tonnes. The information provided describes the material type, estimated quantity (based on the current design) and any available information relating to the use of the material in the construction of the Proposed Scheme. The BoQ data is representative of the two construction options presented in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

16.8.7. This data is not affected by the choice between the two construction programme options and does not include material resources required for specialist plant and equipment (this will be presented within the ES, where available).

Table 16-14: Material Resources Required for Construction

Material Assets	Quantity (tonnes)	Use of Material in the Proposed Scheme
Aggregate	163,060	Comprises granular sub-base material for pavement, footways and landscaping areas and surface chippings.
Asphalt (Bituminous mixtures)	296	For surfacing.
Concrete	84,520	This includes reinforced concrete for structures, foundations, piling and pre-cast concrete for drainage.
Earthworks (imported material)	75,820	Engineered fill material for ground raising.
Steel	16,350	Used in concrete reinforcement and sheet piling.
Plastics (excluding packaging)	100	Drainage pipework, cable ducts and geotextile sheeting.

16.8.8. Further to the information detailed in **Paragraphs 16.6.6** and **16.6.7**, based on the baseline data on availability of bulk material resources within the London and South East regions and nationally at the time of writing, there are currently no significant issues regarding supply and stock.

16.8.9. Information on the inclusion of sustainable features or approaches to works is limited to the reuse of earthwork arisings on the Proposed Scheme. The specification of materials is anticipated to be confirmed prior to the commencement of the construction of the Proposed Scheme. Using professional judgement to apply the criteria set out in **Table 16-3**, the sensitivity of material resources is therefore considered medium.

16.8.10. Where data are available, as reported in the Baseline (**Section 16.6**), the percentage of material resource consumption for the Proposed Scheme has been calculated and presented in **Table 16-15**. This is based on current data rather than future trends.

Table 16-15: Construction Material Resource Consumption

Material	Production / sales data for the region* (Million tonnes)	Proposed Scheme requirements (tonnes)	Percentage of available resource consumed by Proposed Scheme
Primary aggregate	16.1	163,060	1%
Ready-mix concrete	5.5	83,210	1.5%
Asphalt	4.6	296	0.2%
Steel	7.2*	16,350	<0.1%
***nationally where regional data unavailable.**			

16.8.11. Based on the criteria set out in **Table 16-4** using professional judgement and considering the nature and scale of the Proposed Scheme, the magnitude for material resources consumption is considered minor as one or more materials (primary aggregate and ready-mix concrete) is between 1-5% by volume of the regional baseline availability.

The significance of effect for material resource consumption is therefore currently considered to be **Slight Adverse** (**not significant**).

Disposal and Recovery of Waste

Waste Recovery

16.8.12. The quantity of earthworks cut, and identified for reuse, and the recovery of site arisings on the Proposed Scheme (based on data provided in the BoQ) is summarised in **Table 16-16.**

Table 16-16: Forecast Waste Management of Site Arisings

Arisings	Quantity (tonnes unless otherwise stated)	Comments
Earthworks (reused arisings from earthworks cut)	48,560	It is assumed that 100% of soils etc from excavation will be reused on the Proposed Scheme, where suitable, to level the site and use in soft landscaping areas.
Steel from demolition	220	The steel framework will be taken offsite for recycling.
Steel from construction	500	It is assumed that all surplus steel used for reinforcement (rebar) and sheet piling will be taken offsite for recycling (quantity based on a best practice wastage rate of 5%).
Profiled metal sheeting	50	Profiled metal sheeting will be taken offsite for recycling.
Glass (windows)	1	Glass will be taken offsite for recycling.
Concrete yard slab	1,690	The concrete slab will be lifted and crushed onsite for reuse. Any metal rebar will be removed and taken offsite for recycling.
Palisade fencing	5	Fencing will be retained onsite during the construction phase.
Drainage pipework	9	Excavated pipework will be taken offsite for recycling.
Electronic gate	1 no.	The gate will be retained onsite during construction.
Dredged arisings	396,000	Quantity based on Option 3, worst-case dredged arisings volume. The disposal method of the dredged arisings is not known at the time of writing.

16.8.13. All excavation arisings generated from the cut are anticipated to be reused during construction (48,560 tonnes) for site levelling and landscaping. This figure may alter depending on the suitability of the resource for reuse once it has been excavated and tested. Excavation arisings that cannot be reused on the Proposed Scheme will be determined by the contractor and specified in the OCoCP.

16.8.14. As stated in **Table 16-16**, it is anticipated that 100% of soils etc. from excavations will be reused on the Proposed Scheme. However, any excavated arisings that are not suitable for reuse will be considered as part of the SWMP prior to commencement of construction of the Proposed Scheme. The SWMP will be produced in accordance with the Outline SWMP which will prepared as part of the application for development consent. Where suitable, the reuse of earthworks from excavated arisings represents a reduction in the adverse impacts of waste generation by the Proposed Scheme. The resulting diversion of this waste from landfill will reduce adverse effects on landfill as a sensitive receptor.

Waste Disposal

16.8.15. Forecasts for waste are given in **Table 16-17**, based on data provided in the BoQ. Additional waste types (hazardous waste and general construction waste) have been included in the list as, based on professional judgement, they are likely to be generated.

Table 16-17: Forecast Waste Disposal

Excavated and other materials	Quantity (tonnes unless otherwise stated)	Reuse/Recovery/Disposal Process
Concrete (poured)	2,120	Based on a best practice wastage rate of 2%. At this stage it is not known how waste derived from poured concrete used in structures, foundations etc. will be managed. Therefore, a worst-case scenario where this will be disposed to landfill has been applied for the purposes of the assessment.
Hazardous and contaminated waste	Undefined	Contaminated arisings would be sent to landfill if it was not possible to treat them for reuse on the Proposed Scheme. Hazardous waste has not (to date) been identified in the data provided, however, it is best practice that any such waste would be disposed of by being sent to a licensed hazardous landfill.
General construction waste (packaging, surplus materials / off-cuts)	Quantity unknown at this stage	General construction waste will be reused on the Proposed Scheme, where possible, or sent to an offsite recycling facility. Any waste that cannot be recycled or reused would be disposed of to landfill. At this time, and until data verify otherwise, a worst-case scenario that this would be sent to landfill has been applied.

16.8.16. Previous ground investigations have identified contaminants of concern, including elevated concentrations of metals, metalloids, organics and asbestos. Although no hazardous waste has been identified or confirmed at this stage, this will be verified as part of ground investigations that will be undertaken to inform the detailed design. It is anticipated that contaminants found during the construction phase will be appropriately remediated in adherence to applicable legislation and guidance. This is described in **Chapter 17: Ground Conditions (Volume 1)** and will be detailed in the subsequent ES.

16.8.17. National hazardous landfill capacity is currently 12.1Mm^3. The volume of hazardous waste that would need to be generated to have a significant effect on current available capacity is 0.5% which equates to 60,500m^3 (as set out in the significance criteria of **Section 16.4**). Professional judgement can be used to assert that this volume of hazardous waste is unlikely to be generated by the Proposed Scheme.

16.8.18. The use of arisings would be subject to their classification under reuse criteria through the implementation of an MMP. This would be completed prior to commencement of construction of the Proposed Scheme and as it progresses through the construction phase. Onsite storage arrangements for arisings will be considered in the design of the construction site layout to allow stockpiling of materials for onsite reuse, or prior to offsite recovery or disposal.

16.8.19. As stated in **Section 16.6**, the availability of remaining landfill capacity (non-inert waste) within the London and South East England regions is forecast to decrease by 82% to 6.3Mm^3 between 2021 and 2030 (latest construction completion year).Inert waste landfill capacity is forecast to reduce by 44% to 12.1Mm^3 in the same timeframe. Therefore, using the criteria set out in **Table 16-3**, the sensitivity of non-hazardous waste is considered to be Very High, as available capacity would be expected to reduce by over 10%.

16.8.20. Waste anticipated to be disposed of to landfill comprises surplus poured concrete (2,120 tonnes/890m^3), as well as hazardous wastes and general construction wastes of unknown quantity.

16.8.21. Using the criteria in **Table 16-4**, the disposal of waste generated by the Proposed Scheme (using a reasonable worst-case scenario) would result in a negligible magnitude of impact, as waste generated by the Proposed Scheme will reduce regional landfill void capacity baseline by <1% (this equates to <630,000m^3).

16.8.22. Although there is no data for anticipated hazardous waste generated through construction of the Proposed Scheme, using professional judgement and the scale of the Proposed Scheme against the criteria in **Table 16-4**, it is considered that national hazardous landfill capacity would be reduced by <0.1-0.5%, resulting in negligible magnitude of impact.

16.8.23. For the assessment of effects on remaining landfill capacity, the sensitivity of remaining landfill capacity is Very High. The magnitude of change is Negligible. Therefore, there is likely to be a direct, permanent, long-term **Slight Adverse (not significant)** effect on remaining landfill capacity.

Operation Phase

16.8.24. The likely significant effects for materials and waste associated with the operational phase will be set out in the ES following assessment.

16.8.25. Material required for maintenance works during operation of the Proposed Scheme are, using professional judgement, anticipated to be minimal and not give rise to significant effects on material resource availability.

16.8.26. The amine-based solvents are considered to be widely available with no known issues regarding supply, stocks and production. Therefore, impacts on the availability of this resource as a result of the Proposed Scheme is unlikely to result in significant effects.

16.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

16.9.1. The assessment has concluded that the effects of material consumption and waste generation during the construction phase are not significant. However, best practice design and construction measures to minimise impacts are outlined below. The operation phase has not been assessed at this stage, however, examples of mitigation measures that could be implemented are outlined.

CONSTRUCTION PHASE

Materials

16.9.2. The assessment has concluded that the effects of material resource consumption are **not significant**. Therefore, securing additional mitigation measures through the DCO process is not required.

16.9.3. Nevertheless, the following best practice design and construction methods (outside of the formal DCO planning regime) should be pursued and implemented as part of the OCoCP to minimise as far as possible impacts from using construction and other materials:

- Ensure that the specification of recycled and secondary content in imported materials (such as earthworks, aggregate, concrete and asphalt), is set out during detailed design.
- Maximise where reasonably practicable the use of offsite construction and pre-fabrication methods to encourage a process of assembly rather than construction.
- Capture and communicate actions already undertaken (or planned) within the design for deconstruction and disassembly, to encourage reuse and recycling at the assets' end of life.
- The Project Team will engage early with contractors to identify opportunities to promote materials and products that afford higher sustainability performance than typical industry standards e.g., closed loop plasticised cable ducting; low carbon materials (timber), or technology that is powered through renewable energy sources.

Waste

16.9.4. The assessment has concluded that the effects of waste generation are **not significant**. Therefore, securing mitigation measures through the DCO process is not required. However, best practice design and construction methods (outside of the formal DCO planning regime) should be pursued and implemented as part of the OCoCP to minimise as far as possible the effects of waste generation and disposal. These options could include:

- The Contractor will develop and implement a SWMP (to be prepared in accordance with the Outline SWMP) and MMP (to be prepared prior to commencement of construction of the Proposed Scheme), to drive performance in the highest tiers of the Waste Hierarchy, thereby maximising recovery, reuse and recycling. As a requirement of the MMP, testing of site arisings will be a critical step in validating suitability for reuse in different structural and non-structural applications.
- Site arisings will be suitably stockpiled to maximise reuse. Stockpiles will be designed to minimise quality degradation, damage and loss of resource. The following considerations will be taken into account: the stockpile location, the underlying soil type and condition, methods for prevention of erosion and leachate generation, and use of appropriate signage. These considerations will be described in more detail in the OCoCP.
- The Project Team will engage early with contractors to identify possible enhancement and other opportunities to reduce waste through collaboration and regional synergies.

OPERATION PHASE

16.9.5. Mitigation measures (if required by the assessment to be undertaken as part of the ES) will include the use of existing onsite waste prevention, minimisation and management processes and procedures to drive good practice behaviour and contracts, to maximise action in the highest tiers of the Waste Hierarchy and adherence to the proximity principle. Circular Economy practices will be identified and considered to design out wastes, reduce wastes and to divert materials from landfill, into other productive uses. **Section 2.2** of **Chapter 2: Site and Proposed Scheme Description (Volume 1)** presents the solvent regeneration and processing systems to recover, manage and reduce waste from the carbon capture process, including amine-based solvent.

16.10. MONITORING

16.10.1. As detailed in **Section 16.9**, a SWMP will be prepared by the Contractor (in accordance with the Outline SWMP) and will include management and monitoring of site waste to reduce associated impacts, including potential harm to the environment.

16.10.2. A MMP will also be produced by the Contractor and used to monitor the maximum reuse of both natural soils and made ground (contaminated or otherwise).

16.11. RESIDUAL EFFECTS

16.11.1. **Table 16-18** below summarises the residual effects associated with the Proposed Scheme.

Table 16-18: Materials and Waste Summary of Residual Effects

Description of the effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual effect
Construction Phase				
Consumption of material resources	Material resources	**Slight Adverse (not significant)**	No mitigation required (see **Section 16.9** for recommended measures)	**Slight Adverse (not significant)**
Disposal and recovery of waste	Landfill void capacity	**Slight Adverse (not significant)**	No mitigation required (see **Section 16.**9 for recommended measures)	**Slight Adverse (not significant)**
Operational Phase				
Consumption of material resources (amine-based solvents)	Material resources	To be determined through assessment in the ES.		
Disposal and recovery of waste	Landfill void capacity	To be determined through assessment in the ES.		

16.12. NEXT STEPS

16.12.1. Further work to be completed and included in the ES comprises:

- The materials and waste assessment will be further developed and refined based on any relevant responses to the Statutory Consultation.
- The detailed assessment within the ES will involve a review of the materials and waste assessment presented in this chapter, based on further information as part of ongoing design development in accordance with the methodologies outlined in **Section 16.4** above.
- An assessment of resource consumption (amine-based solvents) during the operational phase.
- An assessment of waste categories, and tonnages, expected to be generated during the operation phase of the Proposed Scheme.
- Good practice opportunities to minimise and manage wastes during the operational phase will be outlined.
- An Environmental Permit will be sought (the Applicant will pursue appropriate permitting relating to the operation of the Proposed Scheme), which would control potential impacts from waste generated by the use of amine-based solvents and information on this application and its timing will be provided in the ES.

16.13. LIMITATIONS AND ASSUMPTIONS

16.13.1. This section outlines the limitations, uncertainties, and assumptions made in undertaking the Materials and Waste assessment reported in this Chapter.

- This assessment has been undertaken as a desk-based study, using publicly available information.
- The data used is based on the BoQ and it is expected that this data will be refined as the design progresses and updated accordingly in the ES.
- The resources that are expected to be consumed and waste that is expected to arise during the operation phase of the Proposed Scheme will be assessed in the ES as the design progresses and further information is available. Accurate estimates of likely waste generation volumes during operation of the Proposed Scheme will, to a significant extent, be dictated by the system processes to be utilised by the Proposed Scheme.
- The baseline presented in this chapter uses the most recent available data, which is up to and including 2022 (unless stated otherwise). Where updated data are published during the preparation of the ES, it will be included.
- Both quarry and landfill operators can claim commercial confidentiality for their data at time of submission; data for sites with a commercial confidentiality agreement in place are therefore unavailable for the baseline presented in this chapter. However, this is not likely to affect this assessment.
- In line with the IEMA Guide[30], a lifecycle assessment (including embodied carbon and water) of materials will not be part of the assessment process. Embodied carbon has been assessed in **Chapter 13: Greenhouse Gases (Volume 1)**.

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DECARBONISATION

CHAPTER 17: GROUND CONDITIONS AND SOIL

Cory Decarbonisation Project

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TABLES

17. GROUND CONDITIONS AND SOILS

17.1. INTRODUCTION

17.1.1. This chapter reports the preliminary assessment of the likely significant effects of the Proposed Scheme on ground conditions and soils during construction and operation and describes:

- relevant policy, legislation and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operational phase.

17.2. POLICY, LEGISLATION, AND GUIDANCE

17.2.1. The policy, legislation, and guidance relevant to the assessment of ground conditions and soils for the Proposed Scheme is detailed in **Table 17-1**.

Table 17-1: Ground Conditions and Soils – Summary of Key Policy, Legislation, and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011[1]	Sets out the Government's policy for delivery of major energy infrastructure and is currently the primary basis for decision making of applications within the Planning Act 2008 regime. Paragraphs 5.4.3 to 5.4.4 relate to Biodiversity and Geological Conservation *"Where the development is subject to an EIA the applicant should ensure that the ES clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance… The applicant should show how the project has taken advantage of the opportunities to conserve and enhance… geological conservation interests"*. Paragraphs 5.10.5 to 5.10.7 relate to Open Space, Green Infrastructure and Green Belt which states: *"The ES should identify existing and proposed land uses near the project, any effect of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site*

Policy, Legislation or Guidance	Description
	from continuing. Applicants should also assess any effects of precluding a new development or use proposed in the development plan… During any pre-application discussions with the applicant the LPA should identify any concerns it has about the impacts of the application on land use, having regard to the development plan and relevant applications and including, where relevant, whether it agrees with any independent assessment that the land is surplus to requirements… Applicants should safeguard any mineral resources on the proposed site as far as possible, taking into account the long term potential of the land use after any future decommissioning has taken place". Paragraphs 5.16.2 to 5.16.3 relate to Water Quality and Resources which states: *"Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment as part of the ES or equivalent… Applicants are encouraged to consider protective measures to control the risk of pollution to groundwater beyond those outlined in Water Resource Management Plans… The ES should in particular describe… the existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges, proposed new discharges and proposed changes to discharges…. any impacts of the proposed project on water bodies or protected areas …and source protection zones (SPZs) around potable groundwater abstractions".*
Draft Overarching National Policy Statement (NPS) for Energy EN-1 2023[2]	This Draft Overarching National Policy Statement for Energy (EN-1) is part of a suite of draft NPSs issued by the Secretary of State of DESNZ. It sets out the government's policy for delivery of major energy infrastructure and will likely replace the 2011 NPSs by the time the application for the Proposed Scheme is submitted. Paragraph 4.2.2 states that "*The Regulations specifically refer to effects on population, human health, biodiversity, land, soil, water, air, climate, the landscape, material*

Policy, Legislation or Guidance	Description
	assets and cultural heritage, and the interaction between them". Paragraph 5.11.3 states that *"Although the re-use of previously developed land for new development can make a major contribution to sustainable development by reducing the amount of countryside and undeveloped greenfield land that needs to be used, it may not be possible for many forms of energy infrastructure".* Paragraph 5.11.4 states that *"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 5.11.5 states that *"Where pre-existing land contamination is being considered within a development, the objective is to ensure that the site is suitable for its intended use. Risks would require consideration in accordance with the* contaminated land statutory guidance[21] *as a minimum".* Paragraph 5.11.8 states that "*The ES should identify existing and proposed land uses near the project, any effects of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site from continuing. Applicants should also assess any effects of precluding a new development or use proposed in the development plan. The assessment should be proportionate to the scale of the preferred scheme and its likely impacts on such receptors. For developments on previously developed land, the applicant should ensure that they have considered the risk posed by land contamination and how it is proposed to address this".* Paragraph 5.11.13 states that "*Applicants should also identify any effects and seek to minimise impacts on soil health and protect and improve soil quality taking into account any mitigation measures proposed*". Paragraph 5.11.14 states that "*Applicants are encouraged to develop and implement a Soil Management Plan which could help minimise potential land contamination. The*

Policy, Legislation or Guidance	Description
	sustainable reuse of soils needs to be carefully considered in line with good practice guidance where large quantities of soils are surplus to requirements or are affected by contamination". Paragraph 5.11.15 states that "*Developments should contribute to and enhance the natural and local environment by preventing new and existing developments from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability*". Paragraph 5.11.16 states that "*Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans".* Paragraph 5.11.17 states that "*Applicants should ensure that a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination*". Paragraph 5.11.18 states that "*For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination, and where contamination is present, applicants should consider opportunities for remediation where possible. It is important to do this as early as possible as part of engagement with the relevant bodies before the official pre-application stage*[a]". Paragraph 5.11.19 states that "*Applicants should safeguard any mineral resources on the proposed site as far as possible, taking into account the long-term potential of the land use after any future decommissioning has taken place*". *Paragraph 5.11.23* states that *"Although in the case of most energy infrastructure there may be little that can be done to mitigate the direct effects of an energy project on the existing use of the proposed site (assuming that some of that use can still be retained post project construction)*

[a] See https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm[19]

Policy, Legislation or Guidance	Description
	applicants should nevertheless seek to minimise these effects and the effects on existing or planned uses near the site by the application of good design principles, including the layout of the project and the protection of soils during construction". Paragraph 5.11.28 states that "*Where a proposed development has an impact upon a Mineral Safeguarding Area (MSA), the Secretary of State should ensure that appropriate mitigation measures have been put in place to safeguard mineral resources*".
National Planning Policy Framework (NPPF) 2023[3]	The NPPF sets out the Government's planning policies for England and how these should be applied, with the following chapters relating to ground conditions and soils: Chapter 11: Making Effective Use of Land (paragraphs 119 to 120): *"Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or 'brownfield' land…Planning policies and decisions should…support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land".* Chapter 15: Conserving and Enhancing the Natural Environment (paragraphs 174 to 185): *"Planning policies and decisions should contribute to and enhance the natural and local environment by:* *a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);* *d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;* *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality,*

Policy, Legislation or Guidance	Description
	taking into account relevant information such as river basin management plans; and *f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate…* *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…* *Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development".* Chapter 17:Facilitating the Sustainable Use of Minerals (paragraphs 210 to 216): *"Planning policies should…Set out criteria or requirements to ensure that permitted and proposed operations do not have unacceptable adverse impacts on the natural and historic environment or human health, taking into account the cumulative effects of multiple impacts from individual sites and/or a number of sites in a locality;…* *Minerals planning authorities should:…encourage underground gas and carbon storage and associated infrastructure if local geological circumstances indicate its feasibility… When determining planning applications, minerals planning authorities should ensure that the integrity and safety of underground storage facilities are appropriate, taking into account the maintenance of gas*

Policy, Legislation or Guidance	Description
	pressure, prevention of leakage of gas and the avoidance of pollution".
The London Plan 2021[4]	The Spatial Development Strategy for Greater London setting out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policy G9: Geodiversity and Policy SI17: Protecting and Enhancing London's Waterways are the key policies specific to ground conditions and soils. Policy G9: Geodiversity: *"In Development Plans, boroughs should:…Establish clear goals for the management of identified sites to promote public access, appreciation and interpretation of geodiversity…* *Development proposals should…make a positive contribution to the protection and enhancement of geodiversity".* Policy SI17: Protecting and Enhancing London's Waterways: *"Development plans should support river restoration and biodiversity improvements… Development proposals should support and improve the protection of the distinct open character and heritage of waterways and their settings… Development proposals along London's canal network, docks, other rivers and water space (such as reservoirs, lakes and ponds) should respect their local character, environment and biodiversity and should contribute to their accessibility and active water-related uses. Development Plans should identify opportunities for increasing local distinctiveness and recognise these water spaces as environmental, social and economic assets".*
The Bexley Local Plan 2023[5]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development across the Borough, including measures to address geology and ground conditions. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. • Policies relevant to this chapter are Policy SP9 which relates to Protecting and Enhancing Biodiversity and Geological Assets;

Policy, Legislation or Guidance	Description
	• Policy DP20 which relates to Biodiversity and geodiversity in developments including the Protection of designated sites and habitats; and • Policy DP28 which relates to Contaminated land and development and storage of hazardous substances.
London Environment Strategy 2018[6]	The London Environment Strategy objective 5.1 is to "*make more than half of London's area green by 2050*" by significantly increasing the area of green cover in the built environment and providing opportunities to enjoy the capital's natural heritage (including geology) and designed landscapes.
South East Inshore Marine Plan, June 2021[7]	The South East Inshore Marine Plan area stretches from Felixstowe in Suffolk to west of Dover in Kent and incorporates the River Thames. The South East Inshore Marine Plan will help to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan area. The following policies are relevant to ground conditions and soils: • Policy SE-DD-1 – which relates to dredging activity, including navigational dredging; • Policy SE-DD-2 – which relates to avoiding impacts on licensed disposal sites; • Policy SE-DD-3 – which relates to the disposal of dredged material and its assessment against the waste hierarchy; • Policy SE-WQ-1 – which relates to protecting, enhancing and restoring water quality and the avoidance of water pollution; and • Policy SE-MPA-3 – which relates to the avoidance of impacts on areas of designated geodiversity.

Policy, Legislation or Guidance	Description
Legislation	
Environment Act 1995	Part IIA of the Environmental Protection Act 1990, is introduced by Section 57 of the Environment Act 1995, requires an overall risk-based approach to dealing with contaminated sites, which is consistent with the general good practice approach to managing land contamination. The regulatory regime set out in Part IIA is based on the following activities: • Identify the problem; • Assess the risks; • Determine the appropriate remediation requirements; • Consider the costs; • Establish who should pay; and • Implementation and remediation. Section 78A(2) of the Act defines Contaminated Land for the purpose of Part IIA as: *"any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that-* *(a) significant harm is being caused or there is a significant possibility of such harm being caused; or* *(b) pollution of controlled waters is being, or is likely to be, caused."* The basis of the definition is complex and incorporates the concept of risk assessment. This involves identification of contaminant source, pathway and receptor with the essential establishment of pollutant linkages by which the contaminant from the source can reach the receptor via the pathway with the possibility to cause significant harm or the pollution of controlled waters.
The Construction (Design and Management) Regulations 2015 (CDM Regulations)[8]	The main regulations for managing the health, safety and welfare of construction projects. CDM Regulations apply to all building and construction work, including new build, demolition, refurbishment, extensions, conversions, repair and maintenance.

Policy, Legislation or Guidance	Description
Control of Substances Hazardous to Human Health (COSHH) 2002[9]	Law requiring employers to control substances that are hazardous to health. Outlines a precautionary approach to risk management with control strategies aiming to reduce exposure as much as possible.
Control of Asbestos Regulations 2012[10]	Provide a framework for the management of asbestos/asbestos containing materials (ACMs) in existing non-domestic premises and during any work activity involving asbestos. Duty holders must make sure anyone who carries out any work in non-domestic premises and any occupants of the premises are not exposed to asbestos from ACMs that may be present.
The Environmental Permitting (England and Wales) Regulations 2016 (EP Regulations)[11]	These Regulations provide a system for permitting specified environmentally significant operations, a system of consenting of water discharges, a groundwater permitting system and a system of radioactive substances regulation. The EP Regulations require every regulated facility (as defined) to be operated under the authority of an environmental permit. They provide, among other things, for: the discharge of functions by the regulator in relation to permits, procedures for environmental permitting, enforcement notices and other enforcement measures and powers of the regulator.
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017[12]	Regulations that provide a framework for managing the water environment.
The Water Act 2014[13]	The Water Act 2014 is an update to the Water Resources Act 1991 which enables greater competition for non-household customers and gives Ofwat new powers to make rules about charges and charging schemes, as well as making provisions for flood insurance and drainage boards. It is relevant for the Proposed Scheme due to its legislative power in ensuring the protection of controlled waters within the Site.

Policy, Legislation or Guidance	Description
Guidance	
National Planning Practice Guidance (2021)[14]	Sets out the Government's planning policies for England and how these should be applied. The relevant policies under 'Making effective use of land', 'Conserving and enhancing the natural environment' and, 'Facilitating the sustainable use of minerals' are set out in the following Chapters: Chapter 11 – Making Effective Use of Land, Paragraphs 119 to 120; Chapter 15 – Conserving and Enhancing the Natural Environment, Paragraphs 174 to 185; and Chapter 17 – Facilitating the Sustainable Use of Minerals, Paragraphs 210 to 216.
C552 Contaminated Land Risk Assessment: A Guide to Good Practice 2001[15]	Guidance to assist those who carry out contaminated land risk assessments. Includes the overall risk management process involving identifying risks and assessing their significance.
C532 Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors 2001[16]	Provides guidance on environmental good practice for the control of water pollution arising from construction activities. The document focuses on the potential sources of water pollution from within construction sites and the effective methods of preventing its occurrence.
C733 Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks 2014[17]	Guidance to improve the process of risk assessment and risk management on sites that contain soils or made ground potentially contaminated by asbestos.
Land Contamination Risk Management (LCRM) 2021[18]	Technical guidance to be followed by all parties engaged in and responsible for land contamination. To understand the management of contamination issues, the LCRM recommends the use of a Conceptual Site Model (CSM), comprising three elements: a source; a pathway; and a receptor. The CSM will be used to identify and assess the potential effects on the identified sensitive receptors (including human health, controlled waters, buildings and

Policy, Legislation or Guidance	Description
	services) and to outline mitigation measures to manage the risks identified in the assessment.
Guidance on Assessing Risk to Controlled Waters from UK Land Contamination Under Conditions of Future Climate Change 2022[19]	Presents clear practical guidance on how to include the potential effects of climate change in controlled waters risk assessment for land contamination.
Groundwater Protection Technical Guidance 2017[20]	Guidance on managing and protecting groundwater through consideration of the impact on existing or potential uses of ground resources; hydraulic properties of the rock strata; the quality of any receiving groundwater; and any likely changes in circumstances over the time in which groundwater may be impacted.
DMRB LA109 Geology and Soils[21]	Guidance on assessing and managing the effects associated with geology and soils resulting in: • 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.

17.3. SCOPING OPINION AND CONSULTATION

17.3.1. An EIA Scoping Opinion[22] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26th May 2023. The responses from the Planning Inspectorate and statutory consultees in relation to ground conditions and soils and how these requirements should be addressed by the Applicant are set out in **Table 17-2** below.

Table 17-2: Summary of the EIA Scoping Opinion in relation to Ground Conditions and Soils

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Planning Inspectorate			
3.13.1	Effects of sand and gravel extraction and other natural or manmade ground stability impacts	*"The Scoping Report notes that part of the site of the Proposed Development was used for sand and gravel extraction. With the exception of sinkholes referenced as a natural hazard in Scoping Report Chapter 19, no reference is made to ground stability or other ground related hazards which may be present. The ES should provide a description of how ground stability hazards are to be assessed, and in the event that this is undertaken outside of the ES (for example a geotechnical risk register or as part of detailed design), provide a justification for this."*	Ground stability hazards are addressed in the Phase I Contaminated Land Preliminary Risk Assessment and reported in this technical chapter. The Phase I Contaminated Land Preliminary Risk Assessment will also be updated, if required, and presented in Chapter 17: Ground Conditions and Soils (Volume 1) of the ES.
3.13.2	Third party receptors	*"As it is acknowledged that the risk to third party receptors is required to be scoped in, the ES should also consider the risk to third party non-human receptors such as building fabric and utilities."*	The EIA Scoping Report[23] identified that the risk to non-human receptors of below ground services and building structures within the Site will be assessed in this technical chapter and in Chapter 17: Ground Conditions and Soils (Volume 1) of the ES.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.13.3	Agricultural land and soils	*"Based on the urban location of the Proposed Development, the Inspectorate in in agreement that agricultural land uses and land classification can be scoped out of the assessment for the construction and operational phases."*	No response required.
3.13.4	Human heath, controlled waters, building fabric and services during the operation phase	*"Based on the Scoping Report stating that any contamination would be remediated prior to the operational phase, and the mitigation measures proposed, the Inspectorate is in agreement that human heath, controlled waters, building fabric and services can be scoped out for the operational phase only in relation to ground conditions and soils. Comments related to the risk to surface water and groundwater from the ongoing operation of the Proposed Development (storage and use of liquids etc) are provided in Table 3-7 of this Scoping Opinion."*	Risk to surface water and groundwater are considered further in **Chapter 11: Water Environment and Flood Risk (Volume 1)**.
3.13.5	Methodology	*"The Inspectorate notes that the qualitative risk assessment criteria and probability classification in Tables 16-4 to 16-6 are not directly linked to the significance criteria in Tables 16-7 and 16-8. The ES should detail how the qualitative risk assessment is to be used to determine the significance of effects."*	Clarification of the terminology is provided within this technical chapter in **Section 17.4**, linking the risk assessment and probability classification to the significance criteria and subsequently to determine the significance of effects.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.13.6	Ecological and other non-human receptors	*"Paragraph 16.8.3 of the Scoping Report states that ecological receptors are to be considered, however the remainder of this chapter does not mention this receptor. For clarity, the Inspectorate considers that an assessment of ecological receptors is required to be scoped into the ES."*	Risks posed to ecological receptors by the release of potential contamination from sediments are considered in **Chapter 7: Terrestrial Biodiversity (Volume 1)** and **Chapter 8: Marine Biodiversity (Volume 1)**.
3.13.7	Groundsure Report	*"The Scoping Report includes reference to a Groundsure report purchased in January 2023. The ES should confirm if this is to be updated, as the datasets provided as part of this report are regularly updated."*	It is not considered necessary to update the Groundsure Report included in **Appendix 17-1: Groundsure Report (Volume 3)**. However, this will be kept under review in case of any material amendments to the Site that an update.
3.13.8	Groundwater Dependent Terrestrial Ecosystems (GWDTEs)	*"The Scoping Report is not consistent in its description of the sensitivity of GWTDE. Paragraph 16.5.1 states that they are considered to be a sensitive receptor, whereas 16.3.9 states that there are no GWTDE close enough to the site to be affected. The ES should be consistent in the description of receptors identified within each chapter."*	The GWTDE has been removed as a sensitive receptor in this technical chapter as there is not considered to be a plausible pathway present. Table 3.7 of the Planning Inspectorate's Scoping Opinion, specifically 3.7.8, states that the Planning Inspectorate agrees that an assessment of GWTDE can be scoped out.
3.13.9	Mitigation plans	*"The ES should clearly state how the mitigation plans and specifications interact with each other, as it is considered likely that some aspects of*	Any interaction between mitigation plans and specifications are included within this preliminary assessment and will be assessed within Chapter 17:

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		remediation or material reuse will be common to several of the plans."	Ground Conditions and Soils (Volume 1) of the ES.
London Borough of Bexley			
N/A	N/A	*"The Council is generally satisfied at the details submitted in this chapter and that the applicant has adequately addressed this issue at this stage."*	No response required.
Environment Agency			
6	N/A	*"the Environment Agency does not provide detailed site-specific advice or* *comments with regard to land contamination issues apart from identifying the site sensitivity* [that]…*This site partly overlies a Secondary A bedrock aquifer"*	No response required.
6	N/A	*"The evaluation of any risks to human health arising from the site should be discussed with the Environmental Health Department.* *We recommend that the applicant:* • *Refers to the Environment Agency Land Contamination: Risk Management guidance;* • *Uses BS 10175:2011+A2:2017, Investigation of potentially contaminated sites –*	Assessments are being undertaken in accordance with industry legislation, guidance and best practice including those that are recommended by the Environment Agency. Risks to human health arising from the Proposed Scheme, identified through the Ground Conditions and Soils assessments (as set out within this PEIR and as will be further detailed within the subsequent

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		Code of Practice as a guide to undertaking the desk study and site investigation scheme; • *Uses MCERTS accredited methods for testing contaminated soils at the site; and* • *Consult our website at www.environment-agency.gov.uk for further information about any permissions that may be required.*"	ES), will be discussed with LBB Environmental Health Department and all other relevant regulators.
6	N/A	*"The scope of the proposed EIA is acceptable in principle in that it outlines key issues of concern including water quality (Chapter 10) and land contamination (Chapter 16). We welcome the proposed inclusion of a piling risk assessment in Chapter 10, and that sediment plume modelling will be undertaken."*	A piling risk assessment will be completed if considered necessary once the detailed design of the Proposed Scheme is progressed. Refer to **Chapter 11: Water Environment and Flood Risk (Volume 1)** for details of the sediment modelling to be undertaken.
6	N/A	*"We note the two proposed projects (carbon capture and hydrogen production) will produce waste effluent. It is assumed these will either be treated on-site and disposed of to foul sewer (under consent) or taken for treatment at an appropriately licensed facility. Any discharge to the environment would be subject to environmental permitting regulations. It may be beneficial to include waste effluents in Chapter 14 (Materials and Waste)."*	Please refer to **Chapter 16: Materials and Waste (Volume 1)** for information concerning the management of waste during the Proposed Scheme.

17.3.2. **Table 17-3** provides a summary of the engagement and consultation undertaken to inform the ground conditions and soils assessment to date.

Table 17-3: Ground Conditions and Soils - Consultation and Engagement Summary

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
13th February 2023, Email	LBB	Contacted regarding environmentally pertinent information and substructure and geological hazard data held relating to the Study Area. Response received asking for a plan showing the approximate location of the facility to support LBB's land use enquiry (27th February 2023).
28th February 2023, Email	LBB	A plan was sent to LBB as requested. No response has been received regarding pertinent information relating to the Study Area at the time of writing.

17.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

17.4.1. The ground conditions and soils assessment of the Proposed Scheme has been undertaken in line with the legislation, policy and guidance described in **Section 17.2**.

POTENTIAL SIGNIFICANT EFFECTS

17.4.2. As set out in the EIA Scoping Report[23], the following effects are considered to be significant and have been considered further in this assessment:

- Construction Phase:
  - site users and staff (excluding construction staff) – in relation to potential exposure to contamination within the underlying soils / groundwater;
  - construction staff – in relation to potential exposure to contamination within the underlying soils/groundwater and reuse of site-won materials (including dredged arisings);
  - third party neighbours – in relation to potential exposure to contamination within underlying soils/groundwater;
  - controlled waters – in relation to potential contamination within the underlying soils/groundwater; and
  - below ground services and building structures – in relation to potential contamination within the underlying soils/groundwater.

17.4.3. The effects associated with potential contamination of the water environment, such as pollution of controlled water from spillages, is outlined in **Chapter 11: Water Environment and Flood Risk (Volume 1)**.

17.4.4. The reuse of site-won materials (including dredged arisings) on the Site will be dependent on the condition that the materials are assessed to be geochemically and geotechnically suitable for use. Further details of this assessment will be set out in the OCoCP.

17.4.5. The reuse of site-won materials is considered to only be of potential significance to construction staff as site users, staff and third-party neighbours are highly unlikely to be in contact with potentially contaminative arisings during the construction phase.

17.4.6. The OCoCP will include measures to mitigate the migration of potential contamination from site materials to controlled waters receptors. Below ground services and building structures will not come into contact with materials considered unsuitable for reuse.

17.4.7. As stated in **Chapter 16: Materials and Waste (Volume 1)**, it is anticipated that site-won materials will be reused on the Proposed Scheme, where suitable. If considered unsuitable , site-won materials will be taken offsite for reuse, unless circumstances dictate it must be disposed to landfill. Please refer to **Chapter 16: Materials and Waste (Volume 1)** for further details on the reuse of site arisings and the potential disposal method of dredged arisings.

17.4.8. There are not considered to be any potentially significant effects regarding ground conditions and soils during the operation phase because it is anticipated that any contamination identified during the construction phase will be remediated in line with national and local planning policy upon consideration of the proposed end use.

MATTERS SCOPED OUT

17.4.9. The following effects are considered unlikely to be significant and therefore have not been considered further in this assessment:

- Construction Phase:
  - agricultural land and soils in relation to potential contamination within the underlying soils/groundwater; and
  - no GWTDE sites have been reported within close proximity of the Study Area and have therefore been scoped out. This is also demonstrated within Chapter 6: Terrestrial Biodiversity, Chapter 7: Marine Biodiversity and Chapter 10: Water Environment and Flood Risk of the EIA Scoping Report[23].
- Operation Phase:
  - human heath, controlled waters, below ground services and building structures and agricultural soils during the operation phase.

SENSITIVE RECEPTORS

17.4.10. The following sensitive receptors have been identified:

- Human Health:
  - site users and staff (excluding construction staff);
  - construction staff; and
  - third party neighbours (commercial, hospitality, residential and members of the public).
- Controlled Waters:
  - groundwater within the Secondary Undifferentiated Aquifer, Secondary A Aquifers and Principal Aquifer; and
  - surface water – River Thames and other surface water features (considered in **Chapter 11: Water Environment and Flood Risk (Volume 1)**).
- Below Ground Services and Building Structures.

BASELINE DATA COLLECTION

17.4.11. A desk-based data collection exercise has been undertaken, which included a review of available information to determine the baseline conditions.

17.4.12. The key sources of information used to determine the baseline ground and soils conditions are:

- Groundsure Report, dated 25 January 2023, Order Ref: GS-9317318[24];
- British Geological Survey (BGS) Geology Online Viewer[25];
- British Geological Survey (BGS) GeoIndex Onshore Online Viewer[26] ;
- Coal Authority Interactive Map[27];
- Flood Map for Planning website[28];
- Multi Agency Geographic Information for the Countryside (MAGIC)[29];
- Public Health England, UK Maps of Radon[30];
- London Borough of Bexley Council Planning Applications[31];
- Zetica UXO Risk Maps[32];
- Google Earth satellite imagery[33];
- British Geological Survey (BGS)[34];
- Online GeoIndex Onshore[35];
- Online Viewer – Hydrogeological Map of the UK, 1: 625,000[36]; and
- a site walkover survey completed on the 8 February 2023.

17.4.13. The Groundsure Report is presented in **Appendix 17-1: Groundsure Report (Volume 3)**.

ASSESSMENT METHODOLOGY

17.4.14. Based on the potential significant effects set out above, the scope of the assessment is set out below.

17.4.15. The Environment Agency's LCRM Guidance[18] is to be followed, as is required by all parties engaged in and responsible for land contamination. In the context of ground conditions and soils, the LCRM Guidance provides a technical framework in the understanding of how contamination issues that may arise could be managed.

Conceptual Site Model

17.4.16. The LCRM Guidance recommends the use of a Conceptual Site Model (CSM) to understand risk, comprising three elements: a source, a pathway, and a receptor. Each element is described below:

- Source – I presence of potential contaminants that may cause harm;
- Pathway – a physical linkage between the source and receptor; and
- Receptor – those that are identified as being sensitive to the potential contamination (including human health, controlled waters, buildings, services, and ecological systems).

17.4.17. Without a source, pathway or receptor being present, there can be no contamination risk. For example, the presence of measurable concentrations of contaminants within the ground/subsurface/soils does not delineate a contamination risk unless pollutant linkages have been defined and there is a risk of harm to receptors.

17.4.18. The CSM has been used to identify source, pathway and receptor linkages by integrating the intended end use for the Site, the Site's characteristics and the Site's surroundings. Thereafter, mitigation measures to manage the risks identified in the CSM have been identified.

17.4.19. The level of risk has been evaluated in accordance with the methodology set out in CIRIA C552.[15] This methodology involves classification of the consequence and probability associated with each potential contaminant linkage and thereby the corresponding level of risk (risk category).

17.4.20. The framework for classifying consequence, presented in full in Table 6.3 of CIRIA C552[15], is summarised in **Table 17-4** below. The consequence classification does not depend on the probability that the consequence will be realised; thus, for a particular pollutant linkage it may be necessary to classify more than one consequence. For example, ground gases pose a risk to both human health and building structures. Both may have a classification of consequence of severe, but the probability may vary, resulting in different levels of risk.

Table 17-4: Qualitative Risk Assessment – Classification of Consequence

Classification	Definition
Severe	• Severe short term (acute) risks to human health, likely to result in significant harm. • Short term risk of pollution of sensitive water resource, • A short term risk to a particular ecosystem, or an organism forming part of such an ecosystem.
Medium	• Chronic damage to human health (significant harm). • Pollution of sensitive water resource. • A significant change in a particular ecosystem, or an organism forming part of such an ecosystem.
Mild	• Pollution of non-sensitive water resource. • Significant damage to crops, buildings, structures and services. • Damage to sensitive buildings / structures / services or to the environment.
Minor	• Harm, not necessarily significant, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health. Easily repairable effects of damage to buildings, structures and services.

17.4.21. The 'severe' consequence classification describes acute risk (arising from short term exposure). The 'medium' classification describes chronic harm (and may constitute 'significant harm' under Part 2A of the Environmental Protection Act[37]).

17.4.22. The framework for classifying probability, presented in full in Table 16.4 of CIRIA C552[15] is summarised in **Table 17-5** below.

Table 17-5: Qualitative Risk Assessment – Classification of Probability

Classification	Definition
High Likelihood	There is a contaminant linkage and an event that appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	It is probable that an event will occur. Whilst not inevitable, it is possible in the short term and likely over the long term.
Low Likelihood	Circumstances are possible under which an event could occur, but it is not certain that (even over the long term) such an event would occur.
Unlikely	It is improbable that an event would occur, even in the very long term.

17.4.23. The level of risk (risk category), ranging from 'very high risk' to 'very low risk', is determined by the consequence and probability classifications using the matrix presented in full in Table 6.5 of CIRIA C552[15] and shown in **Table 17-6** below.

Table 17-6: Qualitative Risk Assessment – Risk Category

Probability	Consequence			
	Severe	**Medium**	**Mild**	**Minor**
High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very Low Risk
Unlikely	Moderate / Low Risk	Low Risk	Very Low Risk	Very Low Risk

Temporal Scope

17.4.24. The temporal scope is detailed in **Chapter 4: EIA Methodology (Volume 1)**.

Significance Criteria

17.4.25. The significance of effects for land contamination on human health, controlled waters below ground services and building structures will be assessed by comparing the difference in risk (as described above in Table 17-5 and Table 17-6) for each contaminant linkage for baseline conditions to those at the construction phase of the Proposed Scheme. **Table 17.7** which is based on Table 3.7 in DMRB LA 104, provides typical descriptions of these significance categories.

17.4.26. The significance levels are therefore Very large, Large, Moderate, Slight and Neutral. These levels are determined by assessing the potential magnitude of impacts upon receptors; where a given receptor has a Very High, High, Medium or Low sensitivity.

Table 17-7: Significance Categories (Effects) and Typical Descriptions

Significance Category	Typical Description
Very Large	Effects at this level are material in the decision-making process.
Large	Effects at this level are likely to be material in the decision-making process.
Moderate	Effects at this level can be considered to be material decision-making factors.
Slight	Effects at this level are not material in the decision-making process.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

17.4.27. Where there is shown to be a decrease in contamination risk, the Proposed Scheme is assessed as having a beneficial effect on the environment in the long term.

Receptor Value / Sensitivity

17.4.28. Assessment of receptor value (sensitivity) for ground conditions will follow the framework described in **Table 17-8** which is based on LA 109: Geology and Soils[37]. Negligible sensitivity has been removed; it is deemed irrelevant as no receptor (in terms of ground conditions) is classed as negligible. The receptor value (sensitivity) levels are therefore Very High, High, Medium and Low.

17.4.29. Factors that may affect the sensitivity of the likely receptor include:

- Human Health – age, weight, sex, duration onsite and distance from the Site Boundary;
- Controlled Waters – distance from the Site and resource potential; and
- Below ground services and building structures – building design including factors such as gas protection measures and depth (below ground level) of services installations.

Table 17-8: Classification of Value (Sensitivity) of Receptors

Receptor Value (Sensitivity)	Description
Very high	Geology: very rare and of international importance with no potential for replacement (e.g., UNESCO World Heritage Sites, UNESCO Global Geoparks, SSSIs and GCR where citations indicate features of international importance). Geology meeting international designation citation criteria which is not designated as such. Soils: • soils directly supporting an EU designated site (e.g., SAC, SPA, Ramsar); and/or • Agricultural Land Classification (ALC) grade 1 & 2 or Land Capability for Agriculture (LCA) grade 1 & 2. Contamination: • human health: very high sensitivity land use such as residential or allotments; • surface water: relevant sensitivity criteria from Table 3.70 in Road drainage and water environment LA 113; and/or • groundwater: use sensitivity criteria in Road drainage and the water environment LA 113.
High	Geology: rare and of national importance with little potential for replacement (e.g., geological SSSI, National Nature Reserves (NNR)). Geology meeting national designation citation criteria which is not designated as such. Soils: • soils directly supporting a UK designated site (e.g., SSSI); and/or • ALC grade 3a, or LCA grade 3.1. Contamination: • human health: high sensitivity land use such as public open space; • surface water: use sensitivity criteria in Road drainage and water environment LA 113; and/or • groundwater: use sensitivity criteria in Road drainage and water environment LA 113.

Receptor Value (Sensitivity)	Description
Medium	Geology: of regional importance with limited potential for replacement (e.g., RIGS). Geology meeting regional designation citation criteria which is not designated as such. Soils: • soils supporting non-statutory designated sites (e.g., Local Nature Reserves (LNR), Local Geological Site (LGS), Sites of Nature Conservation Importance (SINC)); and/or • ALC grade 3b or LCA grade 3.2. Contamination: • human health: medium sensitivity land use such as commercial or industrial; • surface water: use relevant sensitivity criteria in Table 3.70 of Road drainage and water environment LA 113; and/or • groundwater: use relevant sensitivity criteria in Table 3.70 Road drainage and water environment LA 113.
Low	Geology: of local importance/interest with potential for replacement (e.g., non designated geological exposures, former qu'rries/mining sites). Soils: • ALC grade 4 & 5 or LCA grade 4.1 to 7; and/or • soils supporting non-designated notable or priority habitats. Contamination: • human health: low sensitivity land use such as highways and rail; • surface water: use sensitivity criteria in Road drainage and water environment LA 113; and/or • groundwater: use sensitivity criteria in Road drainage and water environment LA 113.

Magnitude

17.4.30. The expected magnitude of impact to each identified receptor will be assigned in accordance with the principles established in LA 109: Geology and Soils[21] and LA 104: Environmental Assessment and Monitoring[38] along with professional judgement. The terms used to describe magnitude of impact are defined in LA 104 and LA 109 and directly reproduced in **Table 17-9**.

Table 17-9: Classification of Magnitude of Impact (Change)

Magnitude of Impact (Change)		Definition
Major	**Adverse**	"*Geology: loss of geological feature / designation and/or quality and integrity, severe damage to key characteristics, features or elements.* *Soil: physical removal or permanent sealing of >20ha of agricultural land.* *Contamination:* • human health: significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria (e.g., category 4 screening levels) SP1010[39] with potential for significant harm to human health. Contamination heavily restricts future use of land".
	Beneficial	"*Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality*".
Moderate	**Adverse**	"*Geology: partial loss of geological feature / designation, potentially adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.* *Soils:* • physical removal or permanent sealing of –ha - 20ha of agricultural land; or • permanent loss / reduction of one or more soil function(s) and restriction to current or approved future use (e.g., through degradation, compaction, erosion of soil resource). *Contamination:* • human health: contaminant concentrations exceed background levels and are in line with limits of relevant screening criteria (e.g., category 4 screening levels) SP1010 Significant contamination can be present. Control / remediation measures are required to reduce risks to human health / make land suitable for intended use".

Magnitude of Impact (Change)		Definition
	Beneficial	"*Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality*".
Minor	**Adverse**	"*Geology: minor measurable change in geological feature / designation attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.* *Soils: temporary loss / reduction of one or more soil function(s) and restriction to current or approved future use (e.g., through degradation, compaction, erosion of soil resource.)* *Contamination:* • human health: contaminant concentrations are below relevant screening criteria (e.g., category 4 screening levels) SP1010 Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health".
	Beneficial	"*Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduce risk of negative impact occurring*".
Negligible	**Adverse**	"*Geology: very minor loss or detrimental alteration to one or more characteristics, features or elements of geological feature / designation. Overall integrity of resource not affected. Soils: no discernible loss / reduction of soil function(s) that restrict current or approved future use.* *Contamination:* • human health: contaminant concentrations substantially below levels outlined in relevant screening criteria (e.g., category 4 screening levels) SP1010. No requirement for control measures to reduce risks to human health / make land suitable for intended use".
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Significance

17.4.31. Once the sensitivity of the affected receptor to change and the magnitude of change have been established, the matrix presented in **Table 17-10**, which is based on LA 104: Environmental Assessment and Monitoring[38], will be used to determine the significance of effect, ranging from 'neutral' to 'very large'. The likely duration of the effect and likelihood of the effect occurring is also considered when assessing each effect.

17.4.32. Where a range has been provided, e.g., 'moderate or large', professional judgement will be used to define the significance. The effects are described as adverse and beneficial. An effect would be considered significant if assessed as moderate or above.

Table 17-10: Significance of Effects Matrix

		Magnitude of Impact (Change)				
		No Change	**Negligible**	**Minor**	**Moderate**	**Major**
Receptor Value (Sensitivity)	**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

17.5. STUDY AREA

17.5.1. Study Areas have been identified for human health (in respect of impacts arising from contamination matters only), controlled waters, and below ground services and building structures.

17.5.2. For the assessment of effects during the construction phase the Study Areas will be limited to:

- Human health – 250m radius of the Site Boundary as per best practice, including Guidance for the Safe Development of Housing on Land Affected by Contamination: R&D Publication 66[40]. The 250m distance is typical at the hazard identification stage of an assessment based on professional judgement.
- Controlled waters – 1km radius of the Site Boundary. This is considered appropriate for indirect effects from potential off-site sources of contamination based on the specifics of the Study Area such as the underlying geology, an appreciation of the water environment and previous land use.
- Below ground services and building structures – The Site Boundary only.

17.5.3. The study areas are shown in **Figure 17-1: Ground Conditions and Soils Study Areas (Volume 2)**.

17.6. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

17.6.1. This section provides a description of the current baseline conditions with respect to ground conditions and soils.

History

17.6.2. The earliest historical maps available (from 1864) show that the Site comprised agricultural fields, a manure works and a gunpowder magazine in the north. From 1888 the manure works was replaced by Belvedere Mills and the Thames Fish, Guano and Oil Works was located to the west of the mills. Historical maps from 1958 show that a depot replaced the fish, guano and oil works. Extensive development occurred onsite from 1966 with an unspecified works located in the south and sand/gravel extraction activity in the centre of the Site.

17.6.3. Recent data shows that Belvedere Mill ceased activity circa 2001. Satellite imagery and aerial photographs show that Riverside 1 began construction circa 2008 and has been operational within the Site since 2011.

17.6.4. The surrounding area has undergone extensive industrial and commercial development since approximately 1895. Notable present-day activities of contaminated land concern for the Site include the Crossness Sewage Treatment Works located approximately 230m to the west of the Site Boundary and Belvedere Industrial Estate located approximately 60m to the south of the Site Boundary.

Ground Investigations

17.6.5. Previous ground investigations have targeted various parcels of land within the boundary of the Proposed Scheme. The following reports have been made available to WSP for review:

- Wilkinson Associates; Report Contamination Investigation Greenham Site Waste to Energy Incineration Plant Belvedere for Cory Environmental Limited; ref.: i7-01-02; dated December 1992[41];
- Applied Environmental Research Centre Limited (AERC); Riverside Resource Recovery (Energy from Waste) Facility, Norman Road, Belvedere, Site Investigation and Remediation Proposals Report; ref.: C3477/R1384; dated September 2003[42];
- RSA Geotechnics Ltd.; Ground Investigation at Norman Road, Belvedere, Kent Final Report, ref.: 10487/FINAL; dated February 2007[43];
- Soil Mechanics; Riverside Resource Recovery Facility, Belvedere, Kent Factual Report on Ground Investigation; ref.: A7007; dated April 2007[44];

- AERC; Letter presenting findings of site investigation at Riverside Resource Recovery Facility, Norman Road, Belvedere; ref.: JRW/C34129/R2397; dated 14 August 2006[45];
- AERC; Riverside Resource Recovery (Energy from Waste) Facility, Norman Road, Belvedere, Contaminated Land Remediation Method Statement; ref.: C34129/R2489; dated May 2007[46];
- WSP; Riverside Data Centre Ground Investigation Report Riverside Resource Recovery Ltd.; ref.: 70031031; dated August 2017[47];
- Gavin & Doherty Geosolutions (UK) Ltd. (GDG); Geotechnical Interpretative Report & Contaminated Land Report; ref.: 21083-R-002-02; dated July 2021[48]; and
- TerraConsult; Riverside EfW; ref.: 3765R001-2; dated July 2018[49].

17.6.6. The location of the previous ground investigations is shown in **Figure 17-2: Previous Ground Investigations (Volume 2)**.

17.6.7. Some remediation work has been completed within the Study Area; however, data gaps exist for those areas where no ground investigation has been undertaken to date and unknown contamination could be present. Elevated concentrations of metals, metalloids, organics and asbestos could be present, as previously found.

Unexploded Ordnance

17.6.8. The Zetica Bomb Risk Maps[32] (available from the Zetica Limited website) have been reviewed to provide a preliminary assessment of potential Unexploded Ordnance (UXO) risks. The maps indicated that the Site is within a 'High' risk area from UXO.

Geology

17.6.9. Based on historical BGS records[25], the anticipated geology underlying the Site is summarised in **Table 17-11** below.

Table 17-11: Anticipated Geology (underlying the Site)

Stratum		Description
Artificial	Made Ground	Unknown.
Superficial	Alluvium	Detrital deposits of silt, sand, clay and gravel.
	Tidal Deposits	Variable lithology. Mainly of silt and clay.
Bedrock	London Clay Formation	Bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay.
	Blackheath Member of the Harwich Formation	May be encountered at the base of the London Clay Formation. Dominated by black and well-rounded flint gravel in a matrix of sand, with lenses of sand and thin clay layers.
	Lambeth Group	Vertically and laterally variable sequences mainly of clay, some silty or sandy, with some sands and gravels, minor limestones and lignites and occasional sandstone and conglomerate.
	Thanet Formation	Typically composed of homogeneous, bioturbated, glauconitic silty fine-grained sand, with sandy silt, silt or sandy, silty clay. The deposits are generally pale yellow-brown in colour, typically wit‘ a 'peppe’ing' of dark-coloured glauconite grains. Sparse white mica occurs throughout. Rare coarse gravel is presInt in pIces in London.
	Upper Chalk Formation	White chalks (microporous coccolithic limestone) with beds of flint, nodular chalks, hardgrounds and marl seams.

17.6.10. As indicated on the Bexley Local Plan Policies Map[50] there are no Minerals Safeguarding Areas (MSA) on the Site or within 5 km of the Site boundary.

Aquifers

17.6.11. The Environment Agency classifies the superficial Alluvium as a Secondary Undifferentiated aquifer and the Tidal Deposits as unproductive. The bedrock London Clay formation is classified as unproductive; the Blackheath Member (Harwich Formation), Lambeth Group, and Thanet Formation as Secondary A aquifers; and the Upper Chalk Formation as a Principal aquifer.

17.6.12. Groundwater may be present as discontinuous pockets of perched water within the Made Ground onsite. Further information regarding aquifer classifications, abstractions and groundwater levels is presented in **Chapter 11: Water Environment and Flood Risk (Volume 1)**.

Surface Water Features

17.6.13. The primary sensitive surface water feature within the Site is the River Thames. There are numerous other surface water features within the Site, which are detailed in **Chapter 11: Water Environment and Flood Risk (Volume 1)**.

Surface Water Abstractions

17.6.14. Surface and groundwater abstractions are considered in **Chapter 11: Water Environment and Flood Risk (Volume 1)**.

Potential Sources of Contamination

17.6.15. **Table 17-12** provides a summary of the potential sources of contamination that may be present at the Site, as well as the potential contaminants of concern resulting from such and their distribution across the Site.

Table 17-12: Potential Sources of Contamination

Potential Source	Potential Contaminants of Concern	Likely/Anticipated Distribution
Onsite		
Made Ground	A wide range of contaminants including heavy metals, metalloids, organics, inorganics, hazardous gases (methane and carbon dioxide), Total Petroleum Hydrocarbons (TPHs), Polyaromatic Hydrocarbons (PAHs), Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs) and asbestos.	Site wide
Marshland and Alluvium (including peat deposits)	Ground gases including methane, carbon dioxide and hydrogen sulphide.	Site wide
Current and Historical Dock / Wharf / Jetty Activities	Metals, metalloids, PAHs, TPHs, solvents, VOCs, SVOCs and asbestos.	Northern area of the Site adjacent and within the River Thames
Historical Manure Works, Bovril Mills, Borax Works, Unspecified Commercial / Industrial Land and Works	A wide range of contaminants including heavy metals, metalloids, organics, inorganics, hazardous gases (methane, carbon dioxide and hydrogen sulphide), TPHs, PAHs, VOCs, SVOCs, asbestos, pathogens.	Northern and central area of the Site
Historical Railway Sidings	Hydrocarbons, PAHs	Northeastern area (terrestrial)
Historical Magazine	UXO	Northeastern area of the Site
Historical Sand/Gravel Pits, Unspecified Pits, Heaps and Refuse Heaps	Metals, metalloids, PAHs, TPH, VOCs, SVOCs, asbestos containing materials, ground gases (methane, carbon dioxide, hydrogen sulphide), pathogens.	Site wide

Potential Source	Potential Contaminants of Concern	Likely/Anticipated Distribution
Historical Fish, Guano and Oil Works	Ground gases (methane, carbon dioxide, hydrogen sulphide), hydrocarbons, PAHs, heavy metals, asbestos containing materials, pathogens	Northern area of the Site (landside)
Riverside 1	Metals, metalloids, PAHs, TPH, VOCs, SVOCs, asbestos.	Northern area of the Site (landside)
Electrical Energy Features	Polychlorinated Biphenyls (PCBs), hydrocarbons	Northern and southern areas
Historical Tanks	Hydrocarbons, PAHs	Northern area of the Site (landside)
Contaminated River Channel Deposits / Licensed Discharge Consents to the River Thames for Trade Discharges – Site Drainage and Historical Sewage	TPHs, heavy metals, metalloids, PAHs, organic compounds, and inorganic compounds, pathogens.	Northern area of the Site (landside)
Fire Fighting Run-off (2005)	Fire fighting agents including perfluoroalkyl and polyfluoroalkyl substances (PFASs) used in firefighting foams.	Site wide
Offsite (within the Study Area)		
Electricity Substations	PCBs, hydrocarbons.	Surrounding land
Made Ground	Ground gases (methane, carbon dioxide, hydrogen sulphide), hydrocarbons, PAHs, VOCs, SVOCs, heavy metals, metalloids and asbestos containing materials.	Surrounding land

Potential Source	Potential Contaminants of Concern	Likely/Anticipated Distribution
Surrounding Industrial / Commercial activities including Powder Magazine, Railway Sidings, COMAH Site (former agricultural chemical company), Unspecified Works, Unspecified Depot, Chimneys, Marshland, Sewage Works, Tanks.	Heavy metals, metalloids, organics, inorganics, hazardous gases (methane, carbon dioxide, hydrogen sulphide), TPHs, PAHs, VOCs, SVOCs, agrochemicals, asbestos and pathogens.	Surrounding land
Offsite Pollution Incidents	Perfluorooctane sulfonate (PFOS) / PFASs, VOCs, heavy metals (from sewage treatment chemicals), inorganic compounds, pathogens.	Surrounding land and water
Licensed Emissions of Regulated Substances to Controlled Waters from Thames Water Utilities Ltd (approximately 264m west)	Asbestos, benzo(b)fluoranthene, naphthalene, arsenic, cadmium, mercury, phosphorus, organotin compounds, phenols, halogenated compounds, fluorides, benzo(a)pyrene, zinc, chloroform, chlorides, Brominated diphenylethers - penta-, octa- and deca- BDE, copper, Dichloromethane (DCM) (Methylene chloride), fluoranthene, Nonylphenols and nonylphenol ethoxylates, octylphenols and octylphenol ethoxylates, cyanides, nickel, nitrogen, anthracene, dioxins and furans, indeno(1,2,3-cd)pyrene, chromium, di(2-ethylhexyl)phthalate (DEHP), lead.	River Thames

Future Baseline

17.6.16. The future baseline for the Proposed Scheme will include the operation of Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken). The future baseline is unlikely to change from that of the baseline in relation to the assessment of ground conditions and soils. As outlined in the Riverside 2 OCoCP, standard contamination measures in line with industry legislation, guidance and best practice are in place for Riverside 2.

17.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

17.7.1. This section sets out the embedded design, mitigation and enhancement measures relevant to the construction phase of the ground conditions and soils assessment. The operation phase has been scoped out of the assessment, as detailed in **Section 17.4**.

CONSTRUCTION PHASE

17.7.2. Relevant design, mitigation and enhancement measures are likely to include:

- Ground investigation undertaken prior to the construction phase pursuant to DCO requirement.
- An OCoCP including, but not limited to, measures addressing materials management, the suitable storage of fuels, and site waste management.
- A Piling Risk Assessment, if applicable, with recommendations followed (prepared as part of the detailed design).
- A Materials Management Plan (prepared as part of the detailed design).
- An Earthworks Specification which details the procedures to follow when preparing the ground for development (prepared as part of the detailed design).
- A Remediation Strategy, which will include measures for the protection from ground gas and potentially vapour ingress (prepared as part of the detailed design, if required and pursuant to DCO Requirement controls).

17.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

17.8.1. This section details the preliminary assessment of impacts and effects for the Proposed Scheme during the construction phase, taking into account the embedded design, mitigation and enhancement measures detailed in **Section 17.7**.

17.8.2. The choice between demolition or retention of the Belvedere Power Station Jetty (disused) will not change the outcomes of the preliminary assessment of impacts and effects reported within this technical chapter. The demolition and removal of the Belvedere Power Station Jetty (disused) would be carried out in accordance with the OCoCP, which will include measures to mitigate the potential contamination risks posed during the demolition activities. Effects from construction have been considered within this technical chapter. If the Belvedere Power Station Jetty (disused) is retained, then there is no effect on ground conditions, although this will be assessed and confirmed in the ES.

RECEPTOR VALUE / SENSITIVITY

17.8.3. The attribute importance (sensitivity) assigned to environmental attributes and contaminated land receptors along with the value is shown in **Table 17-13.**

Table 17-13: Attribute Importance (Sensitivity)

Sensitive Receptor	Justification	Value / Sensitivity
Site users and staff (excluding construction staff)	It is assumed that the Proposed Scheme will be operated in accordance with all relevant legislation, guidance and best practice, which will mitigate occupational risks to future personnel. Areas of soft landscaping/public open land have a greater potential to expose end users (e.g., future personnel, local residents or users of adjacent land) to contaminants.	Low
Construction staff	Construction staff are the most likely receptor to have direct contact with potentially contaminated soil and waters. It is assumed that the construction phase will be undertaken in accordance with all relevant legislation, guidance and best practice, which will mitigate occupational risks to construction workers during works on the Proposed Scheme.	Medium
Third party neighbours	It is assumed that the construction phase will be undertaken in accordance with all relevant legislation, guidance and best practice that will mitigate disturbance and risks to third party neighbours during works on the Proposed Scheme.	Low
Controlled waters	There are inland rivers, other minor watercourses and a pond within the area of the Site. However, the River Thames is a 'main river' as defined by the Environment Agency. The importance of this attribute is therefore 'high'.	High
Below ground services and building structures	Analytical data, used to ensure appropriate construction materials (such as concrete classification) are selected, will be obtained at the detailed design stage.	Medium

Conceptual Site Model

17.8.4. A CSM has been developed as part of the Preliminary Risk Assessment to identify potential contaminant linkages for the Proposed Scheme and is presented in **Table 17-14.**

Table 17-14: Conceptual Site Model

Potential Contaminant Sources	Potential Pathways	Potential Sensitive Receptors	Probability	Consequence	Comments / Risk
Onsite					
PAH, TPH, hydrocarbons, heavy metals, solvents, inorganics, organic matter, VOCs, PCBs, UXO, ground gases, asbestos resulting from: • **Made Ground** • **Marshland** • **Current and Historical Dock / Wharf /Jetty activities** • **Historical Manure works, Bovril Mills, Borax Works, Unspecified Commercial / Industrial Land and Works**	• Dermal contact. • Direct/indirect ingestion of contaminants. • Inhalation of dust/asbestos/ ground gases.	• Site users and staff (excluding construction staff). • Third party neighbours.	Likely	Medium	**Moderate/Low Risk** Previous ground investigations have targeted various parcels of land within the Site of the Proposed Scheme. Some remediation work has been completed; however, data gaps exist for those areas where no ground investigation has been undertaken to date and unknown contamination could be present. Elevated concentrations of metals, metalloids, organics and asbestos could be present as previously found. Gas monitoring completed by WSP in 2017[47] recorded elevated ground gases (carbon dioxide and methane) and classified the two parcels of land to the west of Norman Road as 'Characteristic Situation 4 (CS4) – Moderate to High Risk. The commercial and industrial nature, of the Proposed Scheme means that future site users and staff (excluding

Potential Contaminant Sources	Potential Pathways	Potential Sensitive Receptors	Probability	Consequence	Comments / Risk
• **Historical Railway Sidings** • **Historical Magazine** • **Historical Sand/Gravel Pits, Unspecified Pits, Heaps and Refuse Heaps** • **Historical Fish, Guano and Oil Works** • **Riverside 1** • **Electrical Energy Features** • **Historical Tanks** • **Contaminated River Channel Deposits / Licensed Discharge Consents to the River Thames for Trade Discharges –**					construction staff) should be at a reduced risk of direct exposure from potential contaminants of concern within the underlying ground post construction. However, it is likely that new buildings will require protection from ground gas and potentially vapour ingress. The Proposed Scheme is indicated to be within a 'High' risk area from UXO.
		• Construction staff.	**Likely**	**Minor**	**Moderate/Low Risk** Contaminants of concern including asbestos have been detected within near surface soils and could be present across other areas of the Proposed Scheme that have not been investigated to date. The risk to construction staff from asbestos contaminated soils is considered to be **Moderate**. Adherence to the Site's CDM and H&S rules including use of appropriate PPE should mitigate against exposure to contaminated soils, reducing the risk to **Low**.

Potential Contaminant Sources	Potential Pathways	Potential Sensitive Receptors	Probability	Consequence	Comments / Risk
Site Drainage and Historical Sewage • **Fire Fighting Run-off (2005)**					The OCoCP will detail how activities such as surface and silt run off, covering of stockpiles to stop contaminated dust or particulates becoming airborne will be appropriately managed.
	• Direct contact. • Permeation of hydrocarbons through plastic pipes.	• Below ground services and building structures.	**Likely**	**Mild**	**Moderate/Low Risk** Organic contamination including hydrocarbons within the Made Ground could be located beneath the Site. A high-water table could allow migration of contaminants via service trenches. A new water pipes risk assessment, covering any new water pipes, will likely be required as part of the detailed design in accordance with the UK Water Industry Research (UKWIR) published Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites[51]. Contaminant concentrations within soils and groundwater could present aggressive ground conditions for new subsurface structures.

Potential Contaminant Sources	Potential Pathways	Potential Sensitive Receptors	Probability	Consequence	Comments / Risk
	• Surface run-off processes. • Windblown contamination.	• River Thames. • Surface Water.	**Likely**	**Medium**	**Moderate Risk** The Proposed Scheme is adjacent to the River Thames and is therefore at risk of contaminated surface water entering this surface water body. Other surface water features are located within the Site as listed in **Section 11.6** of **Chapter 11: Water Environment and Flood Risk (Volume 1)**. Previous ground investigations have identified contaminants of concern within groundwater, though further detailed quantitative risk assessment considered the risk posed to the River Thames to be **Low** from shallow groundwater. However, not all areas of the Proposed Scheme have been investigated and data gaps remain. An OCoCP will be required that details how activities such as surface and silt run off, covering of stockpiles to stop contaminated dust or particulates becoming airborne will be appropriately managed during the project's

Potential Contaminant Sources	Potential Pathways	Potential Sensitive Receptors	Probability	Consequence	Comments / Risk
					construction. Compliance with the OCoCP should reduce the risk to **Low**.
	Leaching of contaminants from contaminated soil and vertical migration to groundwater.	• Secondary Undifferentiated Aquifer. • Secondary A Aquifer. • Principal Aquifer. • River Thames. • Surface Water.	**Likely**	**Mild**	**Moderate/Low Risk** A previous controlled waters detailed quantitative risk assessment covering the central and southern areas of the Site reported the following findings: • The Taplow Gravels were found to be in hydraulic connectivity with the River Thames; • The shallow groundwater in the Alluvium was found to be largely stagnant, although is influenced by shallow surface drains and the flood protection measures along the River Thames; • Groundwater flow direction was calculated to be to the north / northwest within both the Alluvium and the Taplow Gravel; and • Elevated concentrations of salt were identified in shallow groundwater

Potential Contaminant Sources	Potential Pathways	Potential Sensitive Receptors	Probability	Consequence	Comments / Risk
					indicating that there was likely saline intrusion from the Thames. The superficial aquifer is less vulnerable to groundwater pollution but will still support the vertical and lateral migration of groundwater where more granular soils are present and thus contaminants. This could impact on the deeper Thanet Formation and Chalk aquifers. The OCoCP will detail how activities such as surface and silt run-off and stockpiles will be appropriately managed during the construction phase of the Proposed Scheme. Existing and future hard landscaping / building footprints installed as part of the construction phase across the Proposed Scheme will reduce infiltration of precipitation before and post redevelopment. The Outline Drainage Strategy required as part of the Proposed Scheme will capture surface run-off post-development. The Outline Drainage

Potential Contaminant Sources	Potential Pathways	Potential Sensitive Receptors	Probability	Consequence	Comments / Risk
					Strategy will be developed and included within the application for development consent. A piling risk assessment would be required during the construction phase to prevent pollution of deeper groundwater bodies.
	Vertical migration of gas through unsaturated soil pore space. Ingress into buildings via service penetrations, floor construction and cracks, wall cavities. Resulting in accumulation in enclosed spaces within buildings. Migration via preferential pathways such as	• Below ground services and building structures.	Low likelihood	Medium	**Moderate/Low Risk** Gas monitoring completed by WSP in 2017[47] for two areas within the Site recorded elevated ground gases (carbon dioxide and methane) and classified the two parcels of land to the west of Norman Road as 'Characteristic Situation 4 (CS4) – Moderate to High Risk'. Accumulation of hazardous gases in confined spaces may increase the risk of explosion from methane and asphyxiation by carbon dioxide under extreme weather conditions such as low and falling atmospheric pressure.

Potential Contaminant Sources	Potential Pathways	Potential Sensitive Receptors	Probability	Consequence	Comments / Risk
	below ground service trenches.				
Offsite (within the Study Area)					
PAHs TPHs hydrocarbons, heavy metals, solvents, inorganics, organic matter, VOC, PCB, ground gases, asbestos resulting from: **Electricity Substations** **Made Ground;** **Surrounding industrial / commercial activities including powder magazine, railway sidings, COMAH site (former agricultural chemical company), unspecified works, unspecified depot,**	Surface run-off processes. Vertical and lateral migration of gases and vapours through unsaturated soil pore space. Migration of gases, vapours and groundwater via preferential pathways such as below ground service trenches. Migration of gases and vapours within impacted groundwater with subsequent volatilisation,	• Site users and staff (excluding construction staff). • Construction staff. • Third party neighbours. • Controlled waters. • Below ground services and building structures.	Low Likelihood	Medium	**Moderate/Low Risk** Nearby industrial land use may act as a source of a broad range of contaminants. The superficial and bedrock aquifers would facilitate the vertical and lateral migration of hazardous gases, vapours and impacted groundwater to within the Site. However, it is by no means certain that even over a longer period such an event would take place, and this is less likely in the short term.

Potential Contaminant Sources	Potential Pathways	Potential Sensitive Receptors	Probability	Consequence	Comments / Risk
chimneys, marshland, sewage works, tanks, electricity substations; • **Offsite pollution incidents; and** • **Licensed emissions of regulated substances to controlled waters from Thames Water Utilities Ltd (approximately 264m west).**	inhalation and ingress into enclosed built structures. Lateral migration of contaminants within impacted groundwater with subsequent direct contact and root uptake.				

ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

17.8.5. The potential likely significant effects for ground conditions and soils associated with the construction phase are set out below in **Table 17.15.**

17.8.6. The management of potential contamination resulting from the construction activities, such as pollution of controlled water from spillages, is outlined in **Chapter 11: Water Environment and Flood Risk (Volume 1)**.

17.8.7. A conservative approach of the assessment of potential likely significant effects has been adopted based on design information available at the time of writing. As design development is ongoing, the likely significance of effect could be subject to change and any updates will be assessed in the EIA and reported in the ES.

Table 17-15: Construction Phase Summary of Significance of Effects

Receptor	Value / Sensitivity	Magnitude of Impact	Significance of Effect
Human Health			
Site users and staff (excluding construction staff)	Low	**Minor beneficial** — the Proposed Scheme is considered unlikely to expose site users, staff and third party neighbours to contaminative substances presuming adequate ground investigation and remediation, if required, is completed as part of the detailed design of the Proposed Scheme.	**Slight Beneficial (not significant)**
Third party neighbours			
Construction staff	Medium	**No Change** — it is assumed the construction phase will be undertaken in accordance with all relevant legislation, guidance and best practice which will preclude adverse impacts to construction workers.	**Neutral (not significant)**
Controlled Waters			
Groundwater within the Secondary Undifferentiated Aquifer, Secondary A Aquifers and Principal Aquifer	Medium	**Minor beneficial** — the Study Area contains potential sources of contamination and there is a potential for ground works to create migratory pathways through which contaminants could migrate into underlying aquifers. However, risk to controlled waters from the Proposed Scheme will be considered via ground investigation and remediation work measures implemented, where required. Such measures will be included in the OCoCP.	**Slight Beneficial (not significant)**

Receptor	Value / Sensitivity	Magnitude of Impact	Significance of Effect
Surface Water - River Thames and other surface water features	Low to medium	**Negligible beneficial** — the Study Area contains potential sources of contamination and there is a potential for ground works to create migratory pathways through which contaminants could migrate into underlying aquifers. Any adverse impacts on groundwater have the potential to impact surface waters via baseflow. However, risk to controlled waters from the Proposed Scheme will be considered via ground investigation and remediation work implemented, where required. Such measures will be included in the OCoCP.	**Neutral (not significant)**
Below Ground Services and Building Structures			
Below ground services and building structures	Medium	**No Change** — analytical data used to ensure appropriate construction materials (such as concrete classification) are selected, will be obtained at the detailed design stage.	**Neutral (not significant)**

17.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

17.9.1. No further additional design, mitigation or enhancement measures are proposed for ground conditions and soils.

17.10. MONITORING

17.10.1. Whilst monitoring would be carried out in accordance with the Piling Risk Assessment, Materials Management Plan, Earthworks Specification and/or Remediation Strategy (as appropriate) no further monitoring of ground conditions and soils effects is considered to be proportionate or to be required.

17.11. RESIDUAL EFFECTS

17.11.1. **Table 17-16** below summarises the residual effects associated with the Proposed Scheme.

Table 17-16: Ground Conditions and Soils - Summary of Residual Effects

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Construction Phase				
Site users and staff (excluding construction staff) – in relation to potential exposure to contamination within the underlying soils / groundwater.	Site users and staff (excluding construction staff)	**Slight Beneficial (not significant)**	None required.	**Slight Beneficial (not significant)**
Third party neighbours – in relation to potential exposure to contamination within the underlying soils / groundwater.	Third party neighbours			
Construction staff – in relation to potential exposure to contamination within the underlying soils / groundwater and reuse of dredged arisings.	Construction Staff	**Neutral (not significant)**	None required.	**Neutral (not significant)**
Controlled waters – in relation to potential contamination within the underlying soils / groundwater.	Groundwater	**Slight Beneficial (not significant)**	None required.	**Slight Beneficial (not significant)**
	Surface Waters	**Neutral (not significant)**	None required.	**Neutral (not significant)**
Below ground services and building structures – in relation to potential contamination within the underlying soils / groundwater.	Below ground services and building materials.	**Neutral (not significant)**	None required.	**Neutral (not significant)**

17.12. NEXT STEPS

17.12.1. Further work to be completed and included in the ES comprises:

- The ground conditions and soils assessment, including the CSM, will be further developed and refined based on any relevant responses to the Statutory Consultation.
- The detailed assessment within the ES will involve a review of the ground conditions and soils assessment presented in this chapter, based on further information as part of ongoing design development.
- A Phase 2 Intrusive Ground Investigation will be required to inform the detailed design (post development consent).

17.13. LIMITATIONS AND ASSUMPTIONS

17.13.1. The following limitations and assumptions have been identified:

- This assessment has been undertaken as a desk-based study, using publicly available information.
- This assessment has relied, in part, on data provided by third parties (e.g., Groundsure, BGS, MAGIC, Public Health England, Zetica UXO) which are the most up-to-date data available at the time of writing. No significant changes or limitations in these datasets have been identified that would affect the robustness of the assessment.

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DECARBONISATION

CHAPTER 18: LANDSIDE TRANSPORT

Cory Decarbonisation Project

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TABLE

18. LANDSIDE TRANSPORT

18.1. INTRODUCTION

18.1.1. This chapter reports the preliminary assessment of the likely significant effects of the Proposed Scheme on landside transport during construction and operation and describes:

- relevant policy and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operational phase.

18.2. POLICY AND GUIDANCE

18.2.1. The policy and guidance relevant to the assessment of landside transport for the Proposed Scheme is detailed in **Table 18-1**.

18.2.2. Landside transport is not governed by legislation in the way that other technical topics are; consequently, legislation is not included in **Table 18-1**.

Table 18-1: Landside Transport Summary of Key Policy and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011[1]	Sets out the Government's policy for delivery of major energy infrastructure and is currently the primary basis for decision making of applications within the Planning Act 2008 regime. Section 5.13: traffic and transport states that *"The transport of materials, goods and personnel to and from a development during all project phases can have a variety of impacts on the surrounding transport infrastructure…"* This NPS states that these should be assessed in a Transport Assessment (TA) and where applicable, appropriate mitigation measures should be proposed.
Draft Overarching National Policy Statement (NPS) for Energy EN-1 2023[2]	This Draft Overarching National Policy Statement for Energy (EN-1) is part of a suite of draft NPSs issued by the Secretary of State of DESNZ. It sets out the government's policy for delivery of major energy infrastructure and will likely replace the 2011 NPSs by the

Policy, Legislation or Guidance	Description
	time the application for the Proposed Scheme is submitted. NPS EN-1 2023 contains the following policy statements of key relevance for the purpose of the assessment of landside transport impacts: • *"The transport of materials, goods and personnel to and from a development during all project phases can have a variety of impacts on the surrounding transport infrastructure and potentially on connecting transport networks…" (Paragraph 5.14.1)* • *"If a project is likely to have significant transport implications, the applicant's ES (see Section 4.2) should include a transport appraisal. (Paragraph 5.14.5)"* • *"The Secretary of State may attach requirements to a consent where there is likely to be substantial HGV traffic that:* – control numbers of HGV movements to and from the site in a specified period during its construction and possibly on the routing of such movements. – make sufficient provision for HGV parking,267 and associated high quality drive facilities either on the site or at dedicated facilities elsewhere, to support driver welfare, avoid 'overspill' parking on public roads, prolonged queuing on approach roads and uncontrolled on-street HGV parking in normal operating conditions. – ensure satisfactory arrangements for reasonably foreseeable abnormal disruption, in consultation with network providers and the responsible police force. (Paragraph 5.14.14)".
National Planning Policy Framework (NPPF) 2023[3]	The NPPF sets out the Government's planning policies for England and how these should be applied. Section 9: Promoting Sustainable Transport, states that *"transport issues should be considered from the earliest stages of plan-making and development proposals, so that the potential impacts of development on transport networks can be addressed*".

Policy, Legislation or Guidance	Description
The London Plan 2021[4]	The Spatial Development Strategy for Greater London sets out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Chapter 10 covers transport and outlines a series of policies relevant to the Proposed Scheme, including: • T1: Strategic Approach to Transport; • T3: Capacity, Connectivity and Safeguarding; • T4: Assessing and Mitigating Transport Impacts; and • T7: Deliveries, Servicing and Construction.
The Bexley Local Plan 2023[5]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development across the Borough. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. Relevant landside transport policies include: • SP10: Bexley's Transport Network; • DP22: Sustainable Transport; and • DP24: Impact of new development on the transport network.
London Environment Strategy 2018[6]	The London Environment Strategy seeks to ensure that London will become a "*zero carbon city by 2050*" by setting out policies and proposals in seven policy areas to address environmental challenges, including the transition to a low carbon circular economy. The Mayor wants to ensure "*London's businesses and workers are supported to be able to compete effectively in, and benefit from, this growing global market*". Transport forms one of the strategy's pillars, with road transport identified as one of the main pollutants in London. To meet the Mayor's ambition target of a zero-emission transport network by 2050 (Objective 6.3) the strategy aims to phase out the use of diesel vehicles alongside a mode shift to sustainable forms of transport (Policy 4.2.1 and Policy 4.3.2). *Policy 4.2.1 Reduce emissions from London's road transport network by phasing out fossil fuelled vehicles,*

Policy, Legislation or Guidance	Description
	prioritising action on diesel, and enabling Londoners to switch to more sustainable forms of transport *Policy 4.3.2 The Mayor will encourage the take up of ultra low and zero emission technologies to make sure London's entire transport system is zero emission by 2050 to further reduce levels of pollution and achieve WHO air quality guidelines*
Decarbonising Transport: A Better, Greener Britain 2021[7]	Confirms that decarbonisation will deliver better, faster, cleaner and more efficient transport for everyone. The document sets out a series of commitments to decarbonise the transport system before 2050, including reforming future local transport funding for local and regional level organisations to design and deliver local place improvements, delivering a zero-emission freight and logistics sector and maximising the benefits of sustainable low carbon fuels.
Mayor's Transport Strategy 2018[8]	This sets out the Mayor's policies and proposals to reshape transport in London over the next two decades. A supplementary proposal was added in November 2022 to address the challenges of toxic air pollution, the climate emergency and traffic congestion.
Kent Local Transport Plan (LTP) 4: Delivering Growth without Gridlock 2016-2031[9]	This Plan brings together Kent County Council's (KCC) transport policies, looking at local developments and issues as well as those relevant at countywide and of national significance. It is anticipated that landside transport construction/operation vehicle trips will interact with the highway network within Kent. As such, it is deemed relevant to include this Plan. LTP4 aims to deliver safe and effective transport ensuring that all Kent's communities and businesses benefit, the environment is enhanced, and economic growth is supported. This ambition will be realised through overarching policies that are targeted at delivering specific outcomes: economic growth and minimised congestion; affordable and accessible door-to-door journeys; safer travel; enhanced environment; and better health and wellbeing. LTP4 is relevant to the Proposed Scheme as vehicles travelling to the Proposed Scheme

Policy, Legislation or Guidance	Description
	are likely to use part of the highway network maintained by KCC as the local highways authority.
Dartford Development Policies Plan 2017[10]	This Plan replaces the remaining parts of the 1995 Borough Local Plan and sets out the main planning policies that DBC will use to assess planning applications, supporting their adopted Core Strategy (2011). It is anticipated that landside transport construction/operation vehicle trips will interact with the highway network within Dartford. As such, it is deemed relevant to include this Plan. Policy DP3 Transport Impacts of Development' states that "development will only be permitted where it is appropriately located and makes suitable provision to minimise and manage the arising transport impacts". This Plan is relevant to the Proposed Scheme as vehicles travelling to the Proposed Scheme are likely to use part of the highway network maintained by DBC as the LPA.
Guidance	
National Planning Practice Guidance (2021)[11]	Explains the processes and tools that can be used through the planning system in England. Guidance on Travel Plans, Transport Assessments and Statements, is provided within the NPPG collection. The guidance recognises that TAs can positively contribute towards encouraging sustainable travel; lessening traffic impacts; improving road safety and reducing the need to increase existing road capacity or provide new roads.
Guidelines for the Environmental Assessment of Traffic and Movement 2023[12]	The IEMA's latest Environmental Assessment of Traffic and Movement report is an update and replacement to its first published impact assessment guidance from 1993. Its aim remains to provide good practice advice built up over the past three decades on the assessment of traffic and movement. Its scope is to provide the basis for systematic, consistent and comprehensive coverage for the assessment of traffic and movement impacts for a wide range of development projects as part of an environmental assessment/statement. The Guidelines are intended to complement professional judgement.

Policy, Legislation or Guidance	Description
London Borough of Bexley: Installation of Temporary Traffic Count Equipment[13]	Guidance note outlines the process in obtaining permission from LBB to undertake and install traffic survey and monitoring equipment. Outlines relevant conditions of installations, restrictions and positioning to ensure safety of operators and general public for the duration of the survey period.

18.3. SCOPING OPINION AND CONSULTATION

18.3.1. An EIA Scoping Opinion[14] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26th May 2023. The responses from the Planning Inspectorate and statutory consultees in relation to landside transport and how these requirements should be addressed by the Applicant are set out in **Table 18-2** below.

Table 18-2: Summary of the EIA Scoping Opinion in relation to Landside Transport

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
The Planning Inspectorate			
3.14.1	Landside hazardous loads – operation	*"The Inspectorate considers the Scoping Report does not provide sufficient certainty that the Proposed Development will not generate any landside hazardous loads during operation. Scoping Report Chapter 19 (Major Accidents and Disasters) indicates that there is a risk of land and water pollution from the storage and use of hazardous materials on site during operation. There is also no certainty at present that potentially hazardous materials such as liquified gases (CO2 and hydrogen) and hazardous wastes would be removed from the site by barge only. Chapter 2 of the Scoping Report lists "hydrogen tube trailers" as a potential export option, and no information is provided as to the transport methodology of deliveries to site for the chemicals to be used during operation. The Inspectorate is therefore not in a position to agree that landside hazardous loads during operation can be scoped out".*	As described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer included in the scope of the Proposed Scheme. An assessment of the landside Hazardous Loads has presented within this chapter. Chapter 19: Marine Navigation of the ES will include an assessment of marine vessels.
3.14.2	Consultation	*"The Applicant should make effort to agree the scope and methodology for the assessment with relevant consultation bodies including the relevant local highway authority, relevant local planning authorities and National Highways".*	Initial discussions have been undertaken with the relevant authorities (see **Table 18-3**) and will be continued throughout ongoing design development.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Environment Agency			
N/A	N/A	*"7: Landside Transport* • *Construction Traffic Management Plan needs to consider loading to the flood defence e.g., by plant or HGV.* • *During operation any landside transport within 16 metres of the flood defence should consider possible adverse effects to the flood defence e.g., vibration and loading from HGV."*	A Framework Construction Traffic Management Plan (FCTMP) will be developed that will outline matters relating to construction vehicles and plant, vehicle access routes and general arrangements.
Port of London Authority			
N/A	N/A	*"Paragraph 17.6.1 states that a Construction Traffic Management Plan (CTMP) will be provided as part of the Proposed Scheme, which will set out measures to mitigate construction effects. As part of the CTMP further information will be required on the proposed use of the River Thames during the construction phase of the scheme.* *With regard to paragraph 17.8.12, the operational phase assessment where relevant should also highlight the hydrogen export/use options particularly the option to utilise Hydrogen tube trailers – requiring a road tanker loading facility on-site. This section of the ES will also need to refer to the potential for vehicular access to the proposed jetty, which is referenced in paragraph 2.2.56 of the Scoping Report."*	A FCTMP will be developed that will outline matters relating to construction vehicles and plant, vehicle access routes and general arrangements. Should any landside construction activities take place via the River Thames, further information will be provided within the FCTMP. Matters relating to construction activities in the River Thames will be dealt with in the pNRA. As described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			included in the scope of the Proposed Scheme.
Metropolitan Police Service and the Mayor's Office for Policing and Crime			
N/A	N/A	*"Crabtree Manorway North is not included in the traffic modelling/assessment study area (it is not listed in paragraph 17.4.2). There are existing issues with traffic congestion in the locality, and therefore we would like this road to be included."*	This road will not be providing access to the Site and therefore will not be included in the scope of the landside transport assessment.
Dartford Borough Council			
N/A	N/A	*"It is noted that this section (table 17-2 p460) refers to DBC's policies but does not include reference to the new emerging Local Plan. Given that this has recently completed its examination stage and therefore is well advanced in its progress, the Council consider that this should be referenced and considered."*	It is noted that both DBC and RBG are in the process of updating their Local Plans (not having achieved adoption to date). The submission documents will be considered and referenced within the ES.
N/A	N/A	*"DBC also note that with regard to the assessment of Land Based Transport, that National Highway are being consulted but Kent County Council (KCC) Highways have not been included. Given that KCC are the local highway authority and are an adjoining upper tier authority and local roads will be impacted, they are an essential consultee on a proposal of this scale. This is despite the fact that as para 17.4.2, the A206 (within Kent) is included in the list of key link roads.*	Initial consultation has been undertaken with the relevant highways authorities, including KCC and DBC (as detailed in **Table 18-3**). These discussions will be continued throughout ongoing design development. The A2026 Burnham Road has been included within the Study

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		The Council also note that Burnham Rd is listed as a key link road but would query this as this should not be considered as a link road given its partially residential nature and that it leads to/from Dartford Town Centre. *At para 17.8.1, the report refers to the assessment methodology being agreed with LBB and the EA.* *The Council feel that assessments carried out should extend into Dartford and Kent and they consider that the methodology should also be agreed with DBC and KCC."*	Area for this assessment as a key A-Road link. It is not envisaged that this link will form part of any approved construction routing; however, it may form a key route to/from the Site for the local construction/ operation workforce.
London Borough of Bexley			
N/A	N/A	*"The proposed approach for obtaining baseline conditions is through a desktop review supplemented by a site visit to establish the existing pedestrian routes, cycle routes, bus services and local highway characteristics. In addition to this, to understand traffic volumes and queues on the highway network queue length surveys, Automatic Traffic Count (ATC), Manual Traffic Count (MCC) and potentially non-motorised surveys will be undertaken. Before commencement, the applicant should provide the proposed methodology and details of the surveys to the Highway Authority for review and approval."*	Initial consultation has been undertaken with the relevant highways authorities, including LBB regarding the initial traffic surveys undertaken (as detailed in **Table 18-3**). Should additional/ repeat surveys be required as a result of ongoing design development, the methodology and scope will be discussed with the relevant authorities.
N/A	N/A	*"The applicant has proposed three future baseline conditions that will be considered; a peak construction year, future year, and design year. The operation of Riverside 2 and committed developments are to be incorporated."*	In scoping the TA consultation with the relevant highways authorities will be undertaken for the assessment years and committed

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			developments to be included within the traffic flows.
N/A	N/A	*"The applicant has proposed the study area will include all transport and highway links from the Proposed Scheme to the surrounding local and strategic road network that would be subject to daily traffic flow changes. Key links are included within the study area, which is acceptable… Further details of the proposed study area should be agreed with the Highway Authority."*	The Study Area is consistent with the Study Area used for the Riverside 2 TA. Initial consultation has been undertaken with the relevant highways authorities, (as detailed in **Table 18-3**) and will be continued throughout ongoing design development.
N/A	N/A	*"The applicant should also be advised to assess the potential movements generated from workforce travel and any disruption to the highway and transport network resulting from a potential road or footway closure associated with construction works."*	The construction phase assessment will consider movements associated with the workforce. A FCTMP will be developed that will outline measures relating to vehicle access routes and general traffic management arrangements.
N/A	N/A	*"The applicant is also advised to consider vehicle volumes that could be generated when the main mode of transporting carbon via the river Thames is not possible due to meteorological effects, jetty outage or on-site capacity issues and the liquid carbon is transported by road."*	In the event that the Proposed Jetty is out of order, or there is a problem with the export vessels/ provider, LCO_2 will remain within or be added to the temporary onshore storage tanks described in **Chapter 2: Site and Proposed**

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			Scheme Description (Volume 1), up to the volume capacity for those tanks. It is not expected that LCO_2 will be transported by road due to the limited availability and viability of suitable vehicles and so any other carbon emissions would not be captured once the storage is at capacity. Accounting for such eventualities would be considered by the Environment Agency in granting a permit for the Proposed Scheme in ensuring the overall minimum 95% capture rate is captured.

18.3.2. **Table 18-3** provides a summary of the engagement and consultation undertaken to inform the Landside Transport assessment to date.

Table 18-3: Landside Transport Consultation and Engagement Summary

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
22nd May 2023, Email	LBB	Scope: Proposed traffic survey scope and construction/operation traffic routing: • Outlined proposed survey types and locations; • Outlined proposed construction traffic routing between proposed site and strategic road network (SRN); and • Outlined proposed survey timings (mid- 2023). Response/Outcomes (7th June 2023): • Suggested additional survey locations which were added to the survey scope; and • Highlighted local guidance note on Installation of Temporary Traffic Count Equipment.
	DBC	Scope: As per the scope for LBB above. Response/Outcomes (26th May 2023): • Noted position as secondary tier authority with KCC acting as primary local highways authority; and • Noted sensitivities surrounding the A2026 Burnham Road due to its residential nature and proximity of Dartford town centre which is readily impacted upon by traffic diverting from the SRN.
	KCC	Scope: As per the scope for LBB above. Response/Outcomes (25th May 2023): • Noted area of Dartford is heavily congested around access to SRN; and • Noted that Riverside 2 did not require modelling of the A2026 Burnham Road junction, nor the A282 J1a or 1b as the level of predicted traffic generation did not warrant it. If the level of traffic is anticipated to be similar to the previous application, then this assumption is likely to remain and therefore no traffic surveys would be required at these junctions. However, evidence should be

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
		provided at the appropriate time to demonstrate this.
	RBG	Scope: As per the scope for LBB above. Response/Outcomes (31st May 2023): • Noted that the survey scope included the main vehicle routes affecting the Borough. No additional comments.
	TfL – Spatial Planning	Scope: As per the scope for LBB above. No response received at the time of writing (correspondence sent to both the Officer that responded directly to the Riverside 2 statutory consultation respondent and also to the TfL Spatial Planning inbox.) Liaison efforts with TfL will be continued throughout ongoing design development.

18.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

18.4.1. The landside transport assessment of the Proposed Scheme has been undertaken in line with the policy and guidance described in **Section 18.2** of this technical chapter.

POTENTIAL SIGNIFICANT EFFECTS

18.4.2. As identified in the EIA Scoping Report[15], the following effects are considered to be significant and have been considered further in this assessment:

- Construction Phase:
  - pedestrian/cyclist severance;
  - pedestrian/cyclist delay;
  - pedestrian/cyclist amenity;
  - fear and intimidation;
  - public transport network
  - driver delay; and
  - accidents and safety.
- Operation Phase:
  - pedestrian/cyclist severance;
  - pedestrian/cyclist delay;
  - pedestrian/cyclist amenity;
  - fear and intimidation;
  - public transport network; and
  - hazardous loads.

MATTERS SCOPED OUT

18.4.3. The following effects are considered unlikely to be significant and therefore have not been considered further in this assessment:

- Operation Phase: Driver delay – as described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer included in the scope of the Proposed Scheme and the Carbon Capture Facility will attract 78 two-way daily vehicular movements (worst-case), which is below the threshold for assessment set out in the IEMA Guidance[12].

SENSITIVE RECEPTORS

18.4.4. The following sensitive receptors have been identified for the Proposed Scheme:

- non-motorised users (pedestrians and cyclists) of the surrounding highway network, PRoW and non-designated public routes; and
- motorised users of the surrounding highway network, including vehicle drivers, public transport users and vulnerable groups.

18.4.5. Construction and operation phase vehicles associated with the Proposed Scheme are likely to utilise the surrounding dual carriageways to access the Proposed Scheme (A2016 Eastern Way, Yarnton Way, A2016 Picardy Manorway /Bronze Age Way and the A206). These highways are not fronted by residential properties and as such residents are not considered to be a sensitive receptor with regards to landside transport.

BASELINE DATA COLLECTION

18.4.6. Both desk-based baseline data collection and traffic surveys have been undertaken.

Desk-based

18.4.7. The key sources of information used to determine the baseline landside transport conditions are:

- Census Journey To Work Data[16];
- 2021 Census[21];
- Road traffic statistics[17]
- Crashmap accident data[18]
- Riverside Energy Park Environmental Statement: Transport Assessment[19]

Traffic Surveys

18.4.8. Following consultation with the local highways authorities, noted in **Table 18-43**, an initial survey area and scope was agreed and conducted which is described below:

- Automatic Traffic Counts (ATC):
  - 19 locations over 14-days between Friday 16th June and Thursday 29th June 2023.

- Manual Classified Count (MCC):
  - 6 locations – 24-hour classified junction turning counts on Thursday 22nd June and Saturday 24th June 2023.

18.4.9. The locations are described in **Table 18-4** and are shown on **Figure 18-1: Traffic Survey Locations (Volume 2)**.

Table 18-4: Traffic Survey Count Locations – June 2023

Reference	Location Description
ATC 1	Norman Road – northern end, next to the entrance to Riverside 1.
ATC 2	Norman Road – southern end, immediately north of A2016.
ATC 3	A2016 Eastern Way.
ATC 4	Yarnton Way.
ATC 5	A2016 Picardy Manorway (west of Norman Road).
ATC 6	A2016 Picardy Manorway (east of Norman Road).
ATC 7	B253 Picardy Manorway.
ATC 8	A2016 Bronze Age Way.
ATC 9	Norman Road – central, north of access to Isis Reach (Asda Belvedere Distribution Centre access).
ATC 10	A206 Northend Road.
ATC 11	A2000 Perry Street.
ATC 12	A206 Thames Road (between Howbury Lane and Crayford Way).
ATC 13	A206 Thames Road (between Crayford Way and Burnham Road).
ATC 14	A2026 Burnham Road.
ATC 15	A206 Bob Dunn Way (between Burnham Road and Central Road).
ATC 16	A206 Bob Dunn Way (between Marsh Street North and A282 J1a).
ATC 17	A220 Bexley Road (Eastern End).
ATC 18	A2041 North of Yarnton Way.
ATC 19	A2041 South of Yarnton Way.
MCC 1	A2016 Picardy Manorway/Clydesdale Way/Yarnton Way/A2016 Eastern Way.
MCC 2	A2016 Picardy Manorway/Norman Road.
MCC 3	A2016 Picardy Manorway/Anderson Way/A2016 Bronze Age Way/B253 Picardy Manorway.
MCC 4	A2016 Bronze Age Way/A206 Queens Road/A206 Bexley Road/Bexley Road/Walnut Tree Road.

Reference	Location Description
MCC 5	A206 Queens Road/James Watt Way.
MCC 6	A206 South Road/Boundary Road/A206 Northend Road/Larner Road.

18.4.10. During the survey period, it was noted the following locations encountered some disruptions to the recorded data:

- ATC 1 and ATC 9 (Norman Road): These were severed by street sweepers relating to nearby construction activities. Reinstallation attempts were made but the equipment was continually damaged and as such were unable to be replaced. To inform the assessment undertaken within this technical chapter, data for Norman Road has been calculated using a hybrid of data collected at other locations (ATC 2 and MCC 2).
- ATC 13 (A206 Thames Road): Damaged part way through the recording period, with the recorded data spanning:
  - Sunday 11th June to Wednesday 14th June;
  - Thursday 22nd June to Saturday 24th June; and
  - Saturday 1st July to Saturday 8th July 2023.

ASSESSMENT METHODOLOGY

18.4.11. The baseline information (outlined in **Section 18.46**) provides an understanding of the existing transport conditions and flow of traffic. This transport dataset will inform the TA that will comprehensively assess the impact of the Proposed Scheme, during both the construction and operation phases, on the transport networks surrounding the Site. This will include capacity assessments of any junctions that may be identified as being under stress and/or where significant increases in vehicle movements are anticipated. The TA will be presented as part of the application for development consent.

18.4.12. The assessment of landside transport effects will ultimately be undertaken for two future years to provide a robust assessment of the effects associated with the Proposed Scheme:

- A peak construction year (maximum construction activities) of 2028, which coincides with the expected peak construction activities (aligning with the Option 2 which is considered to be the worst-case scenario for construction traffic due to the consolidated construction programme to provide a robust assessment) as described in **Chapter 2: Site and Proposed Scheme Description (Volume 1).** The peak construction traffic anticipated to be attracted to the Site (outlined further below), will be added to the 2028 peak construction year baseline.
- An operation year of 2033. The typical operational traffic anticipated to be attracted to the Site (outlined further below), will be added to the 2033 operation year baseline.

18.4.13. It is noted that in the EIA Scoping Report[15] an additional assessment year was proposed to coincide with the operation phase of the Hydrogen Project. However, this element of the Proposed Scheme has been removed and an assessment is no longer required.

18.4.14. The assessment year baselines (without development) have been prepared by applying growth factors to the traffic flows collected, obtained from the Trip End Model Presentation Program (TEMPro) v7.2 – adjusted to the National Transport Model (NTM) dataset AF15[20].

18.4.15. The NTM incorporates key committed developments based on approved Local Plans. However, in scoping the TA with the relevant local highways and planning authorities and in undertaking the cumulative effects assessment (the approach to which is detailed in **Chapter 21: Cumulative Effects (Volume 1)**), other committed developments to include in the background growth of the assessment area will be agreed.

18.4.16. Agreement on the years of assessment, the TEMPro growth factors to be applied and the traffic flows of committed developments to be included (where relevant) will be sought with the relevant local highways authorities.

CONSTRUCTION PHASE ASSESSMENT METHODOLOGY

18.4.17. The construction phase assessment has been undertaken in line with the IEMA Guidelines[12]. The assessment evaluates the landside transport conditions during a peak construction year of 2028.

18.4.18. The construction phase assessment includes:

- estimated construction traffic volumes (HGV and light vehicles) including movements associated with materials and waste;
- anticipated vehicle routing during construction; and
- journey to work data (obtained from the latest available Census data).

Construction Phase Traffic

HGV

18.4.19. Construction materials are anticipated to be delivered by road transport. It is assumed that all abnormal indivisible loads would be delivered by road.

18.4.20. It is projected that at the construction peak there would be 1,200 workers onsite, and 288 HGV deliveries (576 two-way movements). This is based upon an assessment of similar sized schemes and is considered a robust estimation of the anticipated peak construction movements. These estimates will be refined and updated as the Proposed Scheme progresses.

18.4.21. The origin of construction related materials (HGV) is currently unknown. However, the TA for the adjacent Riverside 2[19] (now under construction) assumed construction traffic routing from the north/west via the A2016 Eastern Way (25%), and the southeast (towards the M25) via the A2016 Bronze Age Way and A206 (75%). Yarnton Way has a 3.0t weight restriction so would not be suitable for any HGV. The Riverside 2 TA[19] was developed with input and approval from the local highways authorities; therefore the same assumptions have been applied for the Proposed Scheme. Agreement on these assumptions will be agreed with the relevant local highways authorities as part of the ongoing consultation for the scope of the TA for the Proposed Scheme.

Staff

18.4.22. The latest available Census Journey To Work data[21] for the Bexley 003 Middle Layer Super Output Area (MSOA) has been obtained to inform the anticipated distribution and mode split of construction workers and is summarised below in **Table 18-5.**

Table 18-5: Method Used to Travel to Work by Distance Travelled to Work for Bexley 003 MSOA (2021 Census[21])

Mode	Mode Share (%)	Mode	Mode Share (%)
Underground, metro, light rail, tram	5	Public transport	37
Train	17		
Bus, minibus or coach	15		
Taxi	1	Private vehicle	48
Motorcycle, scooter or moped	1		
Driving a car or van	43		
Passenger in a car or van	4		
Bicycle	2	Active travel	13
On foot	11		
Other method of travel to work	1	Other	1
Note: Due to rounding, some totals may not tally.			

18.4.23. As shown in **Table 18-5,** 48% of workers within Bexley 003 MSOA travel to work by private vehicle. Therefore, for the peak construction workforce of 1,200 people, it is anticipated that 576 staff would travel by private vehicle, resulting in 1,152 two-way trips across the daily period (assuming one arrival and one departure trip by each worker). Given the Proposed Scheme is located at the Riverside Campus, it is assumed that construction staff travel habits and hence vehicle trip distribution would be similar, and therefore it has been assumed based upon the information contained within the Riverside 2 TA[19], as shown in **Table 18-6**.

Table 18-6: Staff Vehicle Distribution

Link	Staff Vehicle Trip Distribution (%)
Yarnton Way	10
B253 Picardy Manorway	37
A2016 Bronze Age Way	47
A2016 Eastern Way	6

Construction Total

18.4.24. The resulting worst-case peak daily construction traffic generation (two-way) is shown in **Table 18-7**. This assumes all construction materials and staff arriving by private transport will be arriving by the surrounding road network. These figures form the basis of the Preliminary Assessment of Likely Significant Effects presented in **Section 18.8** of this chapter.

Table 18-7: Worst-case Peak Daily Construction Traffic Generation (two-way)

Link	Staff Vehicle Trips	Construction Material (HGV) Trips	Total
Yarnton Way	115	-	115
B253 Picardy Manorway	427	-	427
A2016 Bronze Age Way	542	432	974
A2016 Eastern Way	69	144	213
Total	**1,154**	**576**	**1,730**

18.4.25. At this stage, a percentage impact assessment has been carried out to inform the assessment using the aforementioned assumptions. As the design develops, the vehicular trip distribution and assignment will be refined using Census origin-destination data and using the most direct/fastest routes to the surrounding strategic links. Junction capacity assessments will be undertaken within the TA at the junctions where MCC surveys were undertaken for the 'peak construction year'. The modelling results will inform the ES. Agreement on these junctions (and any others that may require standalone junctions modelling) will be sought with the local highways authorities.

OPERATION PHASE ASSESSMENT METHODOLOGY

18.4.26. The operation phase assessment has been undertaken in line with the IEMA Guidelines[12]. The operation phase assessment evaluates the landside transport conditions for the year 2033.

18.4.27. The operation phase assessment includes:

- estimated operational traffic volumes (HGV and light vehicles);
- anticipated vehicle routing during operation; and
- journey to work data (obtained from the latest available Census data[21]).

Traffic

18.4.28. Operational traffic for the Proposed Scheme will consist of staff and deliveries.

18.4.29. It is expected that 27 full-time equivalent staff will be involved in the operation of the Proposed Scheme.

18.4.30. The deliveries shown in **Table 18-8** are expected to be required for the regular operation of the Proposed Scheme. As a robust worst-case scenario, it is assumed that all material requirements would be arriving on a hypothetical single day. In regular operation, material deliveries can be scheduled to reduce any impacts on the local road network.

Table 18-8: Anticipated Regular Material and Staff Requirements – Two-Way Traffic Flows

Material and Staff	Notes	Reasonable Worst-case Scenario Traffic Movements (Two-way)
Daily Staff	Staff will operate in shifts	54
Amine-based Solvent	2-4 HGV, every 3 weeks	8
Amine Solvent Waste	2-4 HGV, every 3 weeks	8
Caustic Soda	1 HGV, every 3 weeks	2
Anti-foam	1 HGV, every 3 months	2
Sulphuric Acid, Sodium Hypochlorite, Sodium Bisulphite, Antiscalent	1 HGV (tanker), every 3 weeks	2
Diesel	1 HGV (tanker), every 6 months	2
Total		**78**

18.4.31. The origin of operation related materials (HGV) is currently unknown and has been assumed to be 25% from the north/west (A2016 Eastern Way) and 75% from the southeast (A2016 Bronze Age Way/A206).

18.4.1. The mode share and distribution assumptions applied to the construction staff (outlined in **Table 18-5** and **Table 18-6**) has also been applied to the operational staff movements.

18.4.2. At this stage, a percentage impact assessment has been carried out using the aforementioned assumptions. As the design develops, the vehicular trip distribution and assignment will be refined using Census origin-destination data and using the most direct/fastest routes to the surrounding strategic links. Junction capacity assessments will be undertaken within the TA at the junctions where MCC surveys were undertaken for the 'operation year'. The modelling results will inform the ES. Agreement on these junctions (and any others that may require standalone junctions modelling) will be sought with the local highways authorities.

SIGNIFICANCE CRITERIA

18.4.3. The methodology for assessing the significance of an effect has been based upon the environmental sensitivity (or value/importance) of a receptor and the magnitude of change from baseline conditions.

18.4.4. The approach to determining the sensitivity of receptors, magnitude of impacts and the significance of effects considered for the impacts, as required by the IEMA Guidelines[12], is described below.

Pedestrian and Cyclist Severance

18.4.5. Professional judgement will be applied to determine receptor sensitivity. The IEMA Guidelines[12] notes that previously the DfT had set out a range of indicators for determining the magnitude of impact on pedestrian and cyclist severance. Changes in traffic flow of <30% are regarded as producing 'slight' impact, between 30 - 60% as 'moderate' impact and >90% as 'substantial' impact. These thresholds no longer appear in the guidance but have not been superseded. Consequently, together with specific local conditions (such as the provision of crossing facilities and traffic signal settings) they will be used to determine the magnitude of impact on pedestrian and cyclist severance. The IEMA Guidelines state that caution should be taken in this approach as a low baseline may influence severity, and practitioners are advised to consider local factors.

18.4.6. Together the sensitivity of the receptor and magnitude of the impact will be used to determine the significance of effect, following the approach described at **Chapter 4: EIA Methodology (Volume 1)**.

Pedestrian and Cyclist Delay

18.4.7. There is no formal or published guidance for the assessment of pedestrian and cyclist delay. However, the IEMA Guidelines[12] indicate that there are useful reference resources to assist the competent traffic and movement expert's judgement in determining the significance of pedestrian and cyclist delay. For the purpose of this assessment, changes in traffic flows of 30%, 60% and 90% will be considered to represent a low, medium and high magnitude impact on pedestrian and cyclist delay. The receptor sensitivity will be determined using professional judgement.

18.4.8. Together the sensitivity of the receptor and magnitude of the impact will be used to determine the significance of effect, following the approach described at **Chapter 4: EIA Methodology (Volume 1)**.

Pedestrian and Cyclist Amenity

18.4.9. Professional judgement will be applied to determine receptor sensitivity. The updated IEMA Guidelines[12] suggest a tentative threshold for judging the magnitude of changes in pedestrian and cycling amenity would be where the traffic flow is halved or doubled. In the absence of other criteria, this threshold will be used in the assessment for the Proposed Scheme. The magnitude would be considered as 'high' where traffic flow has doubled and 'low' where traffic flow has halved.

18.4.10. Together the sensitivity of the receptor and magnitude of the impact will be used to determine the significance of effect, following the approach described at **Chapter 4: EIA Methodology (Volume 1)**.

Fear and Intimidation

18.4.11. Professional judgement will be applied to determine receptor sensitivity. In the absence of commonly agreed thresholds for judging the significance of likely fear and intimidation effects, IEMA Guidelines[12] recommend the thresholds outlined in **Table 18-9** are used.

18.4.12. Considerations key to assessing the impact on fear and intimidation include: volume of traffic; percentage of HGV; and the proximity of pedestrians to traffic. In addition, the speed of traffic, the number of turning movements, the proximity of schools and the level of vulnerable groups will be considered. These factors are quantified and graded based on the assigned Total Hazard Score. For example, if the Proposed Scheme results in:

- an increased average traffic flow over 18-hours of 3,500;
- an increase of total heavy vehicle flow by 200; and
- an increase in average vehicle speed of 10mph.

18.4.13. The total degree of hazard score would be 10 (10 + 0 + 0); thereby the level of fear and intimidation is considered 'small' as defined in **Table 18-10**. This is then used to assess the magnitude of change as per **Table 18-11.**

Table 18-9: Fear and Intimidation Degree of Hazard

Average Traffic Flow Over 18-hour day – All Vehicles/Hour 2-way (a)	Total 18-hour Total Heavy Vehicle Flow (b)	Average Vehicle Speed (c)	Degree of Hazard Score
+1,800	+3,000	->40	30
1,200-1,800	2,000-3,000	30-40	20
600-1,200	1,000-2,000	20-30	10
<600	<1,000	<20	0

Table 18-10: Levels of Fear and Intimidation Total Hazard Score

Level of Fear and Intimidation	Total Hazard Score (a) + (b) + (c)
Extreme	71+
Great	41-70
Moderate	21-40
Small	0-20

Table 18-11: Fear and Intimidation Magnitude of Impact

Magnitude of Impact	Change in Step/Traffic Flows (AADT) from Baseline Conditions
High	Two step changes in level
Medium	One step change in level, but with • >400 veh increase in average 18hr two-way all vehicle flow; and/or • >500 HGV increase in total 18hr HGV flow.
Low	One step change in level, with • <400 veh increase in average 18hr two-way all vehicle flow; and/or • <500 HGV increase in total 18hr HGV flow.
Negligible	No change in step changes.

18.4.14. Together the sensitivity of the receptor and magnitude of the impact will be used to determine the significance of effect, as described at **Chapter 4: EIA Methodology (Volume 1)**.

Public Transport Network

18.4.15. There is no formal or published guidance for the assessment of effects on the public transport network. Accordingly, professional judgement will be applied to determine the sensitivity of the receptor and the magnitude of impact on the public transport network. For the purpose of this assessment, the following factors have been taken into consideration:

- changes in bus and rail capacity;
- enhancements to existing routes/services;
- new routes/services; and
- changes to the connectivity/waiting facilities of public transport interchanges.

18.4.16. Together the sensitivity of the receptor and magnitude of the impact will be used to determine the significance of effect, following the approach described at **Chapter 4: EIA Methodology (Volume 1)**.

Driver Delay

18.4.17. To determine the traffic and transport impact of the Proposed Scheme on driver delay, junctions (to be discussed with the local highways authorities) on the highway network will be modelled using appropriate junction assessment software (LinSig, ARCADY and PICADY) with and without the Proposed Scheme for the 'peak construction year' and the 'operation year'. At this stage, the impact on driver delay has not been assessed. Impacts to local network performance will be assessed in the TA and impacts to driver delay presented in the ES.

Accidents and Safety

18.4.18. The assessment of accident risk and highway safety has been based upon specific local circumstances and any identified accident clusters. For example, should a particular link or junction be found to demonstrate a large volume of accidents, the addition of substantial traffic volumes generally would be expected to have an adverse impact on highway safety, due to further increased opportunities for conflict.

18.4.19. The IEMA Guidelines[12] state that *"professional judgement will be needed to assess the implications of local circumstances, or factors, which may elevate or lessen risks of accidents, e.g., junction conflicts"*.

18.4.20. A review of accidents occurring over the most recent three-year period within the area surrounding the Site has identified existing accident clusters, i.e., where 10 or more accidents occurred. This review will determine the sensitivity of the receptor. The criteria used to determine the magnitude of impact to be applied to accidents and road safety is described by **Table 18-12** below. The criteria are in accordance with the IEMA Guidelines[12].

Table 18-12: Accidents and Road Safety: Magnitude of Effect

Magnitude	Definition
Large	Expected change in accident risk of 15+% at the location of existing accident cluster.
Moderate	Expected change in accident risk of 10%-14% at the location of existing accident cluster.
Small	Expected change in accident risk of 5%-9% at the location of existing accident cluster.
Negligible	Expected change in accident risk of less than 5% at the location of existing accident cluster.

18.4.21. Detailed traffic accident data has not been obtained from the local highways authorities at this stage; therefore, the preliminary impact of the Proposed Scheme on accidents and road safety has not been assessed. Detailed Personal Injury Accident data, descriptions and locations will be requested and analysed as part of the TA and this will be used to inform the assessment on accidents and road safety that will be presented within the ES.

Hazardous Loads

18.4.22. The assessment of hazardous loads has been based upon the nature of hazardous loads being transported and the number of movements anticipated to illustrate the potential and likely effect of a catastrophic event.

18.4.23. Hazardous loads are assessed on the basis set out within the IEMA Major Accidents and Disasters Guidance (2020)[22], when it is determined to be a low-likelihood/high-consequence event. Events assessed to be low-consequence (i.e. leaks and spills at construction sites) are not in the scope of major accidents and/or disaster assessments as they do not meet the definition, and hence will be assessed under other criteria.

18.4.24. Given the removal of the Hydrogen Project from the Proposed Scheme, the impact of hazardous loads is not deemed to be of a high-consequence, and hence the impacts are considered within the other significance criteria as described above. As a matter of due diligence, a transport-related hazard assessment will be included within the ES chapter covering the operational materials of diesel for the back-up diesel generators; and chemicals and proprietary amine-based solvent for the Carbon Capture Facility. These materials are readily transported on the highways network in accordance with standard measures, such as secondary containment and the use of registered carriers.

18.5. STUDY AREA

18.5.1. The Study Area for landside transport has been developed following pre-application discussions held with the local highways authorities. The Study Area includes the key links from the Site to the surrounding local and strategic road network that will be subject to daily traffic flow changes resulting from the construction or operation of the Proposed Scheme. The key links include:

- Norman Road;
- A2016 Eastern Way;
- Yarnton Way;
- A2041 Harrow Manorway;
- A2016 Picard Manorway;
- B253 Picardy Manorway;
- A2016 Bronze Age Way;
- A206 Queens Road;
- A206 Northend Road;
- A2000 Perry Street;
- A206 Thames Road; and
- A206 Bob Dunn Way.

18.5.2. The Study Area is shown in **Figure 18-2: Landside Transport Study Area (Volume 2)**.

18.6. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

Access and Location

18.6.1. Riverside 1, including Middleton Jetty, the foreshore of the River Thames and Belvedere Power Station Jetty (disused) are situated within the northern extent of the Site. To the south of Riverside 1 lies the Crossness LNR, Munster Joinery Warehouse, and former industrial land. The area incorporates coastal and floodplain grazing marshes, multiple ponds and ditches and areas of grassland used for horse grazing. The southern perimeter of the Site borders the A2016 Eastern Way.

18.6.2. The main access route to the Site is Norman Road, located off the A2016 Picardy Manorway.

18.6.3. Further information and details on the facilities within and surrounding the Site, including destinations and PRoW are described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

Highway Network

18.6.4. Norman Road is approximately 650m in length; providing vehicular access to Riverside 1 and other business premises. Norman Road is aligned north-south between the Site Boundary and the A2016 Picardy Manorway. It is subject to a 30mph speed limit and has streetlights on the eastern side. The junction of Norman Road and the A2016 Picardy Manorway is a left-in left-out traffic signal-controlled junction.

18.6.5. Norman Road has a footway along its eastern side. A three-stage toucan crossing of Norman Road and the A2016 Picardy Manorway provides connection with the southern footway of the A2016 Picardy Manorway, including the eastbound bus stop.

18.6.6. Norman Road has a mixture of advisory cycle lanes and shared use paths providing a cycle route to the cycle path on the north side of the A2016 Picardy Manorway and the three-stage toucan crossing of Norman Road and the A2016 Picardy Manorway. There are various elements of cycle infrastructure providing a route to Belvedere Rail Station.

18.6.7. Due to the construction of Riverside 2, conditions on Norman Road are temporarily different, with reduced speed limits and pedestrian crossing facilities.

18.6.8. The A2016 Picardy Manorway is a dual carriageway aligned east-west with a 50mph speed limit. It connects with Clydesdale Way/Yarnton Way/the A2016 Eastern Way 100m to the southwest and with Anderson Way/the A2016 Bronze Age Way/B253 Picardy Manorway approximately 330m to the southeast; both in the form of large, priority roundabouts.

18.6.9. The A2016 Eastern Way forms part of the SRN and connects to the A206 South Circular (via the A2016 Western Way) approximately 1.7km to the east of the Woolwich Ferry and 5.8km to the east of the A102 Blackwall Tunnel. Both of these roads form part of the TfL Road Network (TLRN). To the east, the A2016 Bronze Age Way passes through Erith, continuing through Dartford (as the A206) connecting to the A282 at the Dartford Crossing.

18.6.10. London's Ultra Low Emission Zone (ULEZ) was expanded in August 2023, to include the area surrounding the Site. The ULEZ requires non-compliant vehicles to pay a charge (24 hours a day, every day of the year, excluding Christmas Day).

18.6.11. London Lorry Control Scheme restrictions are also in place on the A2016 Eastern Way to the west of the A2016 Picardy Manorway. These require that vehicles over 18t are only permitted to use the road at the following times:

- Weekdays 07:00-21:00; and
- Saturdays 07:00-13:00.

18.6.12. Therefore, all vehicles over 18t accessing the Proposed Scheme outside of these times must route from the east, via the A206 at Slade Green, in accordance with these restrictions.

18.6.13. A summary of the observed traffic flows recorded (averaged weekday 24-hour two-way flows) at the ATC traffic survey locations is summarised in **Table 18-13** below:

Table 18-13: Summary of Observed Traffic Flows – June 2023

Ref	Junction Description	Observed Traffic Flows June 2023
ATC 1	Norman Road – northern end	*
ATC 2	Norman Road – southern end, immediately north of A2016	2,817
ATC 3	A2016 Eastern Way	23,345
ATC 4	Yarnton Way	11,006
ATC 5	A2016 Picardy Manorway (west of Norman Road)	32,646
ATC 6	A2016 Picardy Manorway (east of Norman Road)	31,980
ATC 7	B253 Picardy Manorway	11,934
ATC 8	A2016 Bronze Age Way	26,433
ATC 9	Norman Road – central, north of access to Isis Reach (Asda Belvedere Distribution Centre access)	*
ATC 10	A206 Northend Road	34,312
ATC 11	A2000 Perry Street	17,335

Ref	Junction Description	Observed Traffic Flows June 2023
ATC 12	A206 Thames Road (between Howbury Lane and Crayford Way)	31,602
ATC 13	A206 Thames Road (between Crayford Way and Burnham Road)	43,120*
ATC 14	A2026 Burnham Road	19,549
ATC 15	A206 Bob Dunn Way (between Burnham Road and Central Road)	28,934
ATC 16	A206 Bob Dunn Way (between Marsh Street North and A282 J1a)	29,924
ATC 17	A220 Bexley Road (Eastern End)	10,267
ATC 18	A2041 North of Yarnton Way (capturing vehicles in both directions)	23,473
ATC 19	A2041 South of Yarnton Way (capturing vehicles in both directions)	20,497
***** Indicates location experienced disruptions to survey count which is described in ***Section 18.4.***		

Source: MHC Traffic Pty Ltd.[23]

18.6.14. **Table 18-8** demonstrates that the majority of the Study Area experiences two-way traffic volumes in excess of 20,000 vehicles per day, with most surveyed locations being typical, urban, dual carriageway connecting the surrounding area with the SRN.

Public Transport

18.6.15. The closest bus stops to the site are located on the A2016 Picardy Manorway. The eastbound bus stop (on the northern side) is approximately 130m east of Norman Road and the westbound bus stop (on the southern side) is approximately 50m east of Norman Road. A signal-controlled toucan crossing is provided on the A2016 Picardy Manorway to facilitate crossing movements. There are two bus services which call at these bus stops – 180 and 401 – with both routes offering frequent services to local residential areas and a viable alternative to the private car for future employees.

- 180: towards North Greenwich Station:
  - first service: 04:45, last service: 00:01; typical frequency: 14 minutes.
- 180: towards Erith Quarry/Fraser Road:
  - first service: 05:44; last service: 01:38; typical frequency: 14 minutes.
- 401: towards Bexleyheath Clock Tower:
  - first service: 05:54; last service: 00:06; typical frequency: 30 minutes.
- 401: towards Thamesmead Town Centre:
  - First service: 06:21; last service: 00:35; typical frequency: 30 minutes.

18.6.16. Belvedere station, operated by Southeastern, is located approximately 1.4 km to the south, with the 5a route (Thameslink and Southeastern trains) providing regular and frequent connectivity to London Cannon Street; St Pancras International; London Bridge; Dartford; Gravesend; Slade Green and Gillingham. The 401 bus has a journey time to Belvedere station of 3 minutes.

18.6.17. Abbey Wood Rail Station is approximately 11 minutes on the 180 bus service or one stop west from Belvedere station and provides access to the London Underground network via the Elizabeth Line.

18.6.18. A detailed review of the highway network and public transport services (with full timetable information) will be provided within the TA and used to inform the ES.

FUTURE BASELINE

18.6.19. The future baseline (without development) for landside transport has been developed using the DfT Trip End Model Presentation Program (TEMPro) growth factors. The TEMPro growth factors used are detailed below and applied to the observed data captured in the June 2023 traffic surveys.

18.6.20. The TEMPro inputs for the respective scenarios discussed in **Section 18.4** are outlined below:

- TEMPro version 7.2
- Base Year: 2023
- Future Years: 2028 and 2033
- Area Definition: Geographical Area > LON > Bexley
- Time Period: Average Weekday
- All Modes and Origin/Destination
- Growth Factor(s):
  - 1.036923 (Peak Construction Year - 2028); and,
  - 1.072039 (Operation Year - 2033).

18.6.21. The resultant baseline traffic flows are shown in **Table 18-14** below:

Table 18-14: Summary of Proposed Future Year Traffic Flows

Ref	Junction Description	Peak Construction Year (2028)	Operation Year (2033)
ATC 1	Norman Road – northern end	-	-
ATC 2	Norman Road – southern end, immediately north of A2016	2,921	3,020
ATC 3	A2016 Eastern Way	24,207	25,027
ATC 4	Yarnton Way	11,413	11,799
ATC 5	A2016 Picardy Manorway (west of Norman Road)	33,852	34,998
ATC 6	A2016 Picardy Manorway (east of Norman Road)	33,161	34,284
ATC 7	B253 Picardy Manorway	12,375	12,794
ATC 8	A2016 Bronze Age Way	27,409	28,337
ATC 9	Norman Road – central, north of access to Isis Reach (Asda Belvedere Distribution Centre access)		
ATC 10	A206 Northend Road	35,579	36,784
ATC 11	A2000 Perry Street	17,975	18,583
ATC 12	A206 Thames Road (between Howbury Lane and Crayford Way)	32,768	33,878
ATC 13	A206 Thames Road (between Crayford Way and Burnham Road)	44,712	46,226
ATC 14	A2026 Burnham Road	20,270	20,957
ATC 15	A206 Bob Dunn Way (between Burnham Road and Central Road)	30,002	31,018
ATC 16	A206 Bob Dunn Way (between Marsh Street North and A282 J1a)	31,028	32,079
ATC 17	A220 Bexley Road (Eastern End)	10,646	11,006
ATC 18	A2041 North of Yarnton Way (capturing vehicles in both directions)	24,340	25,164
ATC 19	A2041 South of Yarnton Way (capturing vehicles in both directions)	21,253	21,973

18.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

18.7.1. This section sets out the embedded design, mitigation and enhancement measures which are relevant to the landside transport assessment.

CONSTRUCTION PHASE

18.7.2. Relevant design, mitigation and enhancement measures will be identified in the ES, and these will include:

- FCTMP – this would set out measures to mitigate construction effects, including the development of a Construction Workforce Travel Plan (CWTP). It would establish the estimated quanta of vehicles (including measures to reduce the overall number, e.g., car sharing), vehicle routing, demonstrate that vehicles can access and egress the site safely (swept path analysis), outline restrictions to vehicle movement timings and cover temporary parking restrictions (community considerations). The FCTMP will be produced in accordance with local highways authority guidance and Construction Logistics Planning (CLP) Guidance[24].
- The design will ensure that routes used by walkers and cyclists, including PRoW, long distance walking routes and NCN routes will remain open where practicable and accessible to users during construction. Where this is not practicable, suitable diversions will be identified and agreed with LBB and described in the FCTMP.

OPERATION PHASE

18.7.3. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- Workplace Travel Plan (WTP) – the Proposed Scheme is not anticipated to attract a significant number of movements (by all modes) in the operation phase (see **Table 18-8**). If required, a WTP will be produced which will represent a long-term travel management strategy, detailing specific measures, designed to encourage staff and visitors to travel by more sustainable and active transport options.
- The planned outputs from the Proposed Scheme are anticipated to be transported via the Proposed Jetty, and not via the surrounding road network as a fundamental part of the Proposed Scheme. In the event that the Proposed Jetty is out of order, or there is a problem with the export vessels/ provider, LCO_2 will remain within or be added to the temporary onshore storage tanks described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, up to the volume capacity for those tanks. It is not expected that LCO_2 will be transported by road due to the limited availability and viability of suitable vehicles and so any other carbon emissions would not be captured once the storage is at capacity. Accounting for such eventualities would be considered by the Environment Agency in granting a permit for the Proposed Scheme in ensuring the overall minimum 95% capture rate is captured.

18.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

18.8.1. This section details the preliminary assessment of impacts and effects for the Proposed Scheme during both the construction and operation phases, considering the embedded design, mitigation and enhancement measures detailed in **Section 18.7**.

18.8.2. The choice between demolition or retention of the Belvedere Power Station Jetty (disused) will not change the outcomes of the preliminary assessment of impacts and effects reported within this technical chapter, as the peak construction trips account for the demolition of the Belvedere Power Station Jetty (disused). Should the disused jetty be retained, the quantity of construction activities and associated vehicle movements would reduce, therefore reducing the extent of the adverse landside transport effects reported in this technical chapter, although this will be assessed and confirmed in the ES.

18.8.3. To assess the potential likely significant effects on receptors, the current estimated construction and operation related traffic has been assigned to the network in accordance with the methodology previously outlined in **Section 18.4** of this technical chapter. The construction traffic has been added to the 2028 peak construction year baseline and the operational traffic has been added to the 2033 operation year baseline. The percentage increase has then been calculated, as shown in **Table** 18-15.

Table 18-15: Summary of Future Baseline Flows and Anticipated Construction and Operational Flow Impact

Ref	Junction Description	Construction Traffic	Peak Construction Year (2028) + Construction Traffic % increase	Operational Traffic	Operation Year (2033) + Operational Traffic % increase
ATC 1	Norman Road – northern end	1,730	*	130	*
ATC 2	Norman Road – southern end, immediately north of A2016	1,730	59.2%	130	4.3%
ATC 3	A2016 Eastern Way	213	0.9%	22	0.1%
ATC 4	Yarnton Way	115	1.0%	5	0.0%
ATC 5	A2016 Picardy Manorway (west of Norman Road)	1,730	5.1%	130	0.4%

Ref	Junction Description	Construction Traffic	Peak Construction Year (2028) + Construction Traffic % increase	Operational Traffic	Operation Year (2033) + Operational Traffic % increase
ATC 6	A2016 Picardy Manorway (east of Norman Road)	1,401	4.2%	102	0.3%
ATC 7	B253 Picardy Manorway	-	0.0%	-	0.0%
ATC 8	A2016 Bronze Age Way	974	3.6%	82	0.3%
ATC 9	Norman Road (north of Picardy Manorway) – central	1,730	*	130	*
ATC 10	A206 Northend Road	974	2.7%	82	0.2%
ATC 11	A2000 Perry Street	-	0.0%	-	0.0%
ATC 12	A206 Thames Road (between Howbury Lane and Crayford Way)	974	3.0%	-	0.0%
ATC 13	A206 Thames Road (between Crayford Way and Burnham Road)	974	2.2%	-	0.0%
ATC 14	A2026 Burnham Road	-	0.0%	-	0.0%
ATC 15	A206 Bob Dunn Way (between Burnham Road and Central Road)	974	3.2%	-	0.0%

Ref	Junction Description	Construction Traffic	Peak Construction Year (2028) + Construction Traffic % increase	Operational Traffic	Operation Year (2033) + Operational Traffic % increase
ATC 16	A206 Bob Dunn Way (between Marsh Street North and A282 J1a)	974	3.1%	-	0.0%
ATC 17	A220 Bexley Road (Eastern End)	-	0.0%	-	0.0%
ATC 18	A2041 North of Yarnton Way (capturing vehicles in both directions)	-	0.0%	-	0.0%
ATC 19	A2041 South of Yarnton Way (capturing vehicles in both directions)	-	0.0%	-	0.0%
* Indicates that no baseline traffic flows were recorded at this location. See **Section 18.4**. - indicates that no additional traffic flows are anticipated at that location from the Proposed Scheme.					

CONSTRUCTION PHASE

Pedestrian and Cyclist Severance

18.8.4. The sensitivity of pedestrians and cyclists is determined by the relevant facilities in the surrounding area such as footways, crossing points and cycle facilities, and is deemed as high due to the surrounding network walking and cycling facilities adjacent to the Site and the proposed construction traffic route. The magnitude of change is negligible (<6%) on all links, with the exception of Norman Road (59% traffic flow increase compared with the 2028 baseline flows).

18.8.5. Norman Road functions as an industrial access road and not a major pedestrian and cycling throughfare, and therefore is not considered to be the sole determining highway link in the assessment of the pedestrian and cyclist severance assessment. Norman Road also has pedestrian and cyclist infrastructure beside the carriageway, with appropriate crossing facilities along the key desire lines; therefore, there should be limited reasons for pedestrians/cyclists to cross Norman Road away from the existing signalised crossing locations. Therefore, there is likely to be a direct, temporary, medium term, **negligible (not significant)** effect on pedestrian and cyclist severance.

Pedestrian and Cyclist Delay

18.8.6. For the assessment of effects on pedestrian and cyclist delay, the sensitivity of pedestrians and cyclists is high. The magnitude of change is negligible (<6%) on all links, with the exception of Norman Road (59% traffic flow increase compared with the 2028 baseline flows). Therefore, there is likely to be a direct, temporary, medium term, **negligible (not significant)** effect on pedestrian and cyclist delay.

Pedestrian and Cyclist Amenity

18.8.7. For the assessment of effects on pedestrian and cyclist amenity, the sensitivity of pedestrians and cyclists is high. The magnitude of change is negligible (<6%) on all links, with the exception of Norman Road (59% traffic flow increase compared with the 2028 baseline flows). Therefore, there is likely to be a direct, temporary, medium term, **negligible (not significant)** effect on Norman Road pedestrian and cyclist amenity.

Fear and Intimidation

18.8.8. For the assessment of effects on fear and intimidation, the sensitivity of pedestrians and cyclists is high. The magnitude of change is negligible (no step change in level of fear and intimidation based upon a total hazard score of 20 – degree of hazard of 10 for total heavy vehicle flow increase and 10 for average vehicle speed – for Norman Road). Therefore, there is likely to be a direct, temporary, medium term, **negligible (not significant)** effect on fear and intimidation.

Public Transport Network

18.8.9. For the assessment of effects on public transport networks, the sensitivity of receptors is low due to the available services and frequencies (as outlined in **Section 18.6**). The magnitude of change is low, with an anticipated peak construction 888 daily two-way staff trips anticipated to be undertaken by public transport (based on the journey to work data presented in **Table 18-5**). Given the availability of bus and rail services within proximity of the Site, there is likely to be a direct, temporary, medium term, **Minor Adverse (not significant)** effect on public transport networks.

Driver Delay

18.8.10. At this stage, the impact on driver delay has not been assessed, this will be undertaken as part of the TA and presented in the ES. To determine the traffic and transport impact of the Proposed Scheme on driver delay, junctions (to be agreed with the local highways authorities) on the highway network will be modelled using appropriate junction assessment software (LinSig, ARCADY and PICADY) with and without the Proposed Scheme for the 'peak construction year' and the 'operation year'.

Accidents and Safety

18.8.11. Detailed traffic accident data has not yet been obtained from the local highways authorities at this stage; therefore, the preliminary impact of the Proposed Scheme on accidents and road safety has not been assessed. This will be undertaken as part of the TA and presented in the ES. Detailed Personal Injury Accident data, descriptions and locations will be requested and analysed as part of the TA and this will be used to inform the assessment on accidents and safety.

OPERATION PHASE

18.8.12. The likely significant effects for landside transport associated with the operation phase are set out below.

Pedestrian and Cyclist Severance

18.8.13. For the assessment of effects on pedestrian and cyclist severance, the sensitivity is high. The magnitude of change, as presented in **Table 18-15**, is negligible (<5%) on all links. Therefore, there is likely to be a direct, permanent, long term, **negligible (not significant)** effect on pedestrian and cyclist severance.

Pedestrian and Cyclist Delay

18.8.14. For the assessment of effects on pedestrian and cyclist delay, the sensitivity is high. The magnitude of change, as presented in **Table 18-15**, is negligible (<5%) on all links. Therefore, there is likely to be a direct, permanent, long term, **negligible (not significant)** effect on pedestrian and cyclist delay.

Pedestrian and Cyclist Amenity

18.8.15. For the assessment of effects on pedestrian and cyclist amenity, the sensitivity is high. The magnitude of change, as presented in **Table 18-15**, is negligible. Therefore, there is likely to be a direct, permanent, long term, **negligible (not significant)** effect on pedestrian and cyclist amenity.

Fear and Intimidation

18.8.16. For the assessment of effects on fear and intimidation, the sensitivity of pedestrians and cyclists is high. The magnitude of change is negligible (no step change in level of fear and intimidation based upon a total hazard score of 20 – degree of hazard of 10 for total heavy vehicle flow increase and 10 for average vehicle speed – for Norman Road). Therefore, there is likely to be a direct, permanent, long term, **negligible (not significant)** effect on fear and intimidation.

Public Transport Network

18.8.17. For the assessment of effects on public transport networks, the sensitivity of receptors is low due to the available services and frequencies (as outlined in **Section 18.6**). The magnitude of change is negligible with 21 two-way staff trips anticipated to be undertaken by public transport (based on the journey to work data presented in **Table 18-5**). Therefore, there is likely to be a direct, permanent, long term, **negligible (not significant)** effect on public transport networks.

Driver Delay

18.8.18. At this stage, the impact on driver delay has not been assessed, this will be undertaken as part of the TA and presented in the ES. To determine the traffic and transport impact of the Proposed Scheme on driver delay, junctions (to be agreed with the local highways authorities) on the highway network will be modelled using appropriate junction assessment software (LinSig, ARCADY and PICADY) with and without the Proposed Scheme for the 'operation year' and the 'operation year'.

Accidents and Safety

18.8.19. Detailed traffic accident data has not been obtained from the local highways authorities at this stage; therefore, the preliminary impact of the Proposed Scheme on accidents and road safety has not been assessed. This will be undertaken as part of the TA and presented in the ES. Detailed Personal Injury Accident data, descriptions and locations will be requested and analysed as part of the TA and this will be used to inform the assessment on accidents and safety.

Hazardous Loads

18.8.20. As explained in **Section 18.4** given the removal of the Hydrogen Project from the Proposed Scheme, the impact of hazardous loads is not deemed to be of a high-consequence and would be limited to the diesel for the back-up diesel generators and the delivery of chemicals and proprietary amine-based solvent for the Carbon Capture Facility. For the assessment of hazardous loads, the magnitude of change is low (22 two-way movements quarterly for servicing and maintenance – see **Table 18-8**). Therefore, there is likely to be a direct, permanent, long term, **negligible (not significant)** effect on highway users.

18.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

18.9.1. No further additional design, mitigation or enhancement measures are proposed at this time for landside transport given the results of the preliminary assessment. Any need for additional mitigation to account for the results of traffic modelling in respect of driver delay will be set out in the ES.

18.10. MONITORING

18.10.1. The FCTMP will outline the typical monitoring requirements for landside transport impact during construction.

18.10.2. The WTP, if required, will set out targets and monitoring requirements for staff travel movements. This will be developed in collaboration with the local highways authorities.

18.11. RESIDUAL EFFECTS

18.11.1. **Table 18-16** below summarises the residual effects associated with the Proposed Scheme.

Table 18-16: Landside Transport – Summary of Residual Effects

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Construction Phase				
Pedestrian and Cyclist Severance	PRoW (non-motorised user)	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Pedestrian and Cyclist Delay	PRoW (non-motorised user)	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Pedestrian and Cyclist Amenity	PRoW (non-motorised user)	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Fear and Intimidation	PRoW (non-motorised user)	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Public Transport Network	Public Transport Users	**Minor Adverse (not significant)**	N/A	**Minor Adverse (not significant)**
Driver Delay	Highway Links/Junctions (motorised users)	The assessment will be identified and presented as part of the ES and TA.		
Accidents and Safety	Highway Links/Junctions (motorised users)	The assessment will be identified and presented as part of the ES and TA.		
Operation Phase				
Pedestrian and Cyclist Severance	PRoW (non-motorised user)	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Pedestrian and Cyclist Delay	PRoW (non-motorised user)	**Negligible (not significant)**	N/A	**Negligible (not significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Pedestrian and Cyclist Amenity	PRoW (non-motorised user)	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Fear and Intimidation	PRoW (non-motorised user)	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Public Transport Network	Public Transport Users	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Driver Delay	Highway Links/Junctions (motorised users)	The assessment will be identified and presented as part of the ES and TA.		
Accidents and Safety	Highway Links/Junctions (motorised users)	The assessment will be identified and presented as part of the ES and TA.		
Hazardous Loads	Highway Links/Junctions (motorised users)	**Negligible (not significant)**	N/A	**Negligible (not significant)**

18.12. NEXT STEPS

18.12.1. Further work to be completed and included in the ES comprises:

- Ongoing engagement with local highways authorities regarding:
  - future years to be assessed;
  - committed developments to be included;
  - growth factors;
  - planned highway infrastructure schemes;
  - local restrictions and considerations; and
  - additional junctions/links to surveyed/modelled.
- Refinement of the construction and operational HGV and staff assumptions (quanta, mode share, distribution and assignment).
- The estimation of construction and operation trips will be reviewed through ongoing design development.
- Preparation of a comprehensive TA that will review the existing and future transport conditions in greater detail.
- The detailed assessment within the ES will involve a review of the landside transport assessment presented in this technical chapter, based on further information as part of ongoing design development.

18.13. LIMITATIONS AND ASSUMPTIONS

18.13.1. The following limitations and assumptions have been identified:

- This assessment has relied, in part, on data provided by third parties which are the most up-to-date data available at the time of writing. No significant changes or limitations in these datasets have been identified that would affect the robustness of the assessment.
- The assessment of transport conditions utilises traffic surveys carried out in 2023, which provide a snapshot of the traffic conditions within the local area.
- The traffic survey information obtained to-date include minor variability in conditions due to unplanned disruptions to the data collected as outlined in **Section 18.4**.
- It is assumed that the peak construction year would align with the peak construction activities.
- It is assumed that the majority (75%) of HGV construction traffic would access the Site via the A282/M25, A206, A2016 and Norman Road. HGV construction traffic routing will be secured through the FCTMP.

18.14. REFERENCES

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DECARBONISATION

CHAPTER 19: MARINE NAVIGATION

Cory Decarbonisation Project

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19. MARINE NAVIGATION

19.1. INTRODUCTION

19.1.1. This chapter reports the baseline analysis and preliminary findings of the hazards related to the Proposed Scheme on marine navigation, based on a Preliminary Navigation Hazard Analysis undertaken by NASH Maritime (**Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)**). This chapter describes:

- relevant policy, legislation, and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operational phase.

19.1.2. The Preliminary Navigation Risk Assessment (pNRA) will expand on the findings of the Preliminary Navigation Hazard Analysis and will be included as a technical appendix to the Environmental Statement (ES).

19.2. POLICY, LEGISLATION AND GUIDANCE

19.2.1. The policy, legislation, and guidance relevant to the assessment of marine navigation for the Proposed Scheme is detailed in **Table 19-1**.

19.2.2. The following have been excluded from **Table 19-1** due to a lack of specific policies and guidance relating to marine navigation:

- The Overarching NPS for Energy EN-1 2011[1];
- Draft Overarching NPS for Energy EN-1 2023[2];
- National Planning Policy Framework (NPPF) 2023[3]; and
- National Planning Practice Guidance (2021)[4].

Table 19-1: Marine Navigation Summary of Key Policy, Legislation and Guidance

Policy, Legislation or Guidance	Description
Policy	
NPS for Ports (2012)[5]	Sets out the Department for Transport's policy, and framework for decisions, for new port developments. The NPS for Ports seeks to encourage sustainable port development. Whilst the Proposed Jetty for Proposed Scheme will not have annual capacities above those set out in the NPS for Ports, the Proposed Jetty will add beneficial infrastructure into the Port of London.
The London Plan 2021[6]	The Spatial Development Strategy for Greater London sets out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policies SI14 to SI16 of the London Plan are the key policies specific to marine navigation within Greater London. • Policy SI 14 Waterways – Strategic Role; • Policy SI 15 Water Transport; and • Policy SI 16 Waterways – Use and Enjoyment.
The Bexley Local Plan 2023[7]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development within the Borough. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. The following are the key policies specific to marine navigation: • Policy DP18: Waterfront Development and Development including, or close to, flood defences; • Policy DP19: The River Thames and the Thames Policy Area); and • Policy DP31: Energy Infrastructure.
London Environment Strategy 2018[8]	The London Environment Strategy seeks to ensure that emissions from marine based transportation services are reduced, whilst increasing usage of river based transportation systems.

Policy, Legislation or Guidance	Description
International Maritime Organisation (IMO) Guidelines and Policy 2023[9]	Guidelines and policies governing international shipping which cover a range of areas. The IMO has developed and adopted international collision regulations and global standards for seafarers, as well as international conventions and codes relating to search and rescue, the facilitation of international maritime traffic, load lines, the carriage of dangerous goods and tonnage measurement.
Pilotage Directions 2017[10]	Document produced by the Port of London Authority (PLA) to inform all masters, pilots, and crew operating within the Port of London of the rules, regulations, standards, and protocols for doing so.
South East Inshore Marine Plan 2021[11]	The South East Inshore Marine Plan provides a framework that will shape and inform decisions over how the area's waters are developed, protected and improved over the next 20 years. The following South East Inshore Marine Plan policies relate to Marine Navigation: • SE-PS-1; • SE-PS-2; and • SE-PS-3.
Legislation	
Pilotage Act 1987[12]	An Act of Parliament that governs the operation of maritime pilotage. The Act established "competent harbour authorities" and confers various duties and obligations on them relating to the regulation of shipping movements and the safety of navigation.
Merchant Shipping Act 1995[13]	An Act of Parliament to consolidate the Merchant Shipping Acts 1894 to 1994 and other enactments relating to merchant shipping.
Port of London Act (1968)[14]	Last updated in 2014, this is an overarching document that sets out the constitution, rule and powers, and finances of the port authority, and details who and what can use the River Thames, including the laws and penalties which apply and other provisions.

Policy, Legislation or Guidance	Description
Guidance	
Port Marine Safety Code 2016[15]	Document outlining the safety rules and guidance for harbour authorities, marine facilities, berths and terminals, as well as the general and specific duties and powers relating to them.
Navigational Risk Assessment – Guidance to Owners and Operators[16]	Produced by the PLA to showcase high level initial overview of the risk assessment process and example of how such risk assessment can be undertaken.
Marine Guidance Note (MGN) 654 Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response 2021[17]	This MGN highlights matters to be taken into consideration when assessing the potential for effects on navigational safety and emergency response. It applies in UK Internal Waters, Territorial Sea and Exclusive Economic Zone. Whilst this document does not directly relate to the scope of the Proposed Scheme, the information, principles, best practices, and recommendations are relevant to the marine navigation of the Proposed Scheme.
Revised Guidelines for Formal Safety Assessment (FSA) for use in the International Maritime Organisation (IMO) Rule-Making Process 2018[23]	Guidelines and policies produced by the IMO, the FSA can be used as a tool to help in the evaluation of new regulations for maritime safety and protection of the marine environment.
Thames Vision 2050 (2023)[27]	Produced by the PLA to showcase action plans, and highlight the methods, actions and initiatives that the Authority will be taking as it moves into the future.
Future Trade through the Port of London (2021)[28]	Report produced by Oxford Economics for the PLA that forecasts future cargo expected to be handled in the Port of

Policy, Legislation or Guidance	Description
	London up to 2050 and identifies opportunities and challenges for the PLA and stakeholders.
A Safer Riverside (2020)[30]	Guidance, produced by the PLA and supported by a range of stakeholders including Transport for London and the Metropolitan Police, relating to development alongside and on the tidal River Thames.
Methodology for Assessing the Marine Navigational Safety Risks and Emergency Response of Offshore Renewable Energy Installations (2021)[18]	Produced by the MCA with the co-operation of key stakeholders as a methodology for assessing the marine navigational safety and emergency response risks of offshore renewable energy installations. Whilst this document does not directly relate to the scope of the Proposed Scheme, the information, principles, best practices, and recommendations are relevant to the marine navigation of the Proposed Scheme.
International Association of Lighthouse Authorities (IALA) Recommendation O-139 on the Marking of Man-Made Structures 2013[19]	These recommendations are for the guidance and information for stakeholders such as National Authorities, Lighthouse Authorities, Aviation Authorities and other competent authorities, Aids to Navigation providers, and the contracts, developers and operators involved in marine structures.
Code of Practice for Ship Towage Operations on the Thames (2023)[20]	This Code of Practice was published on 14 June 2021, amended on 13th July 2023, and is reviewed every three years in line with PLA Policy. It is provided for the guidance of Masters, Pilots and tug crews involved or likely to be involved in ship towage operations on the tidal Thames. Ships' agents are also recommended to make themselves familiar with the content of the Code, and in particular the application of Part Two - the Guidelines for the Utilisation of Ship Towage Tugs on the Thames.

19.3. SCOPING OPINION AND CONSULTATION

19.3.1. An EIA Scoping Opinion[21] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26th May 2023. The responses from the Planning Inspectorate in relation to marine navigation and how these requirements should be addressed by the Applicant are set out in **Table 19-2** below.

Table 19-2: Summary of the EIA Scoping Opinion in Relation to Marine Navigation

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Planning Inspectorate			
3.15.1	N/A	*"No matters have been proposed to be scoped out of the assessment."*	No response required.
3.15.2	Legislation	*"Paragraph 18.2.1 of the Scoping Report states that there is no legislation relevant to the assessment. However, Table 18-1 lists two pieces of legislation. The ES should be consistent in its approach to the relevant legislation and guidance and provide a summary of all legislation and guidance referred to".*	Inconsistency acknowledged. The Pilotage Act 1987 and Merchant Shipping Act 1995 have been added to **Table 19-1**.
3.15.3	Baseline Information	*"It is noted that there are discrepancies in baseline information presented within this chapter, specifically in relation to water/ riverbed depths and the number of vessel movements recorded for existing jetties. The ES should present the baseline information in a consistent manner with reference to all relevant available sources".*	Regarding water and riverbed levels, discrepancies have been addressed and corrected within this technical chapter. Regarding vessel movements within this area of the River Thames, the PLA was presented with vessel frequency traffic data for this area of the Thames by NASH Maritime during consultation and agreed Halfway Reach was comparatively quiet. The PLA confirmed that the September 2022 Automatic Identification System (AIS) vessel

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			data used by NASH Maritime for the pNHA (**Appendix 19-1: Preliminary Navigation Hazard Analysis)** is acceptable for use in the pNRA. The Applicant is awaiting confirmation from the PLA on whether it is considered likely that there will be a future increase in passenger vessels. NASH to also consult with recreational users to establish non-AIS vessel movements within the Study Area. References to relevant available sources are provided throughout this technical chapter.
3.15.4	Vessel Movements	*"Paragraph 18.3.14 of the Scoping Report states that analysis is presented for a single month (September 2021). The ES should provide a justification for the use of a single month of surveys undertaken nearly two years ago, setting out any limitations to the data and confirming whether this data has been supplemented in the ES with additional or more recent surveys. The surveys are also noted to not include movements made between Middleton Jetty and Cory's barge moorings, or the majority of recreational craft as they are not required to carry Automatic Identification Systems (as detailed in paragraph 18.3.12). The ES should provide a justification for the omissions*	As described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer included in the scope of the Proposed Scheme. Survey month data has been updated to September 2022. This data was not available at the time of witting for the Scoping Report.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		of these vessel movements, and in the event that the ES is to include an alternative way of counting these, a methodology for the surveys. This is of relevance to the scope of the assessment as both vessels associated with the operation of the Cory owned facilities and recreational vessels are scoped into the assessment, and as such the Inspectorate considers that there should be baseline information available in relation to these. *Table 5-2 of the Scoping Report states that "Any vessels refuelling from the hydrogen project will be existing vessels using the River Thames, and therefore ship refuelling will not result in any additional movements". The ES should provide further evidence to support the assertion that vessels collecting the hydrogen are existing vessels using the Thames. In addition, evidence is required to demonstrate that the additional vessel movements would not result in a likely significant effect on marine navigation, both in terms of the additional number of movements compared with existing and future baselines, and the routing of the additional vessel movements."*	Seasonal variations, such as those relating to tourism (e.g., sightseeing vessels), in monthly vessel data are not considered to be significant due to the nature of the cargo being transported within this area of the Thames. Therefore, one month is considered an appropriate timescale for the baseline information presented in this chapter. The pNRA will include widespread consultations to ascertain how non- Automatic Identification System (AIS) vessels and Cory barges use the River Thames, including accounting for journeys between Middleton Jetty and the Applicant's barge moorings.
Port of London Authority			
N/A	N/A	*"It is important to note that currently there is no proposed new river structure shown on any of the maps included in the scoping report. The existing disused Belvedere Power Station Jetty which will need to be fully decommissioned and dismantled as part of the project is located significantly further inland than where the proposed jetty will likely be situated. Whilst this is*	Details of the existing Belvedere Power Station Jetty (disused) and the Proposed Jetty are noted in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** and **Chapter 3: Consideration of**

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		considered acceptable at this time due to the further work required on the exact location of the new jetty it must be highlighted that there will likely be a significant difference in the location of the existing Belvedere Power Station Jetty and the new jetty for the decarbonisation project."	**Alternatives (Volume 1)**. A decision has not yet been made about whether the Belvedere Power Station Jetty (disused) will be retained or dismantled.
N/A	N/A	*"With regard to the previous Navigational Risk Assessment (NRA) prepared as part of the Riverside 2 redevelopment, to highlight, the Riverside 2 scheme had no additional marine infrastructure associated with it and was based only on the proposed additional barge movements, whereas the marine infrastructure and movements associated with the decarbonisation project will be much more significant and should be recognised by the applicant."*	Marine infrastructure and movements are described in this report, within **Chapter 2: Site and Proposed Scheme Description (Volume 1),** this chapter and **Appendix 19-1: Preliminary Navigation Hazard Analysis**. Further details will be presented as part of ongoing design development within the ES.
Page 6	N/A	*"Paragraph 18.3.5 includes a description of various key navigational features within the study area. Ford's jetty is referenced here, stating that on average there are eight arrivals and departures a month from this Jetty. This is incorrect and is actually more substantially used, with 127 arrivals at this jetty over the last three months and this must be reflected in the ES. Furthermore, although it partly outside of the study area, Thunderer Jetty should also be highlighted, as this also has capacity for larger vessels, with several visiting the jetty in a month that are 119-133m LOA."*	Arrival and departure values have been updated between within **Appendix 19-1: Preliminary Navigation Hazard Analysis**, and these values now mirror the values detailed in this comment and are included in the assessment. Thunderer Jetty has now been included and detailed as a navigational feature, with detail provided in **Appendix 19-1:**

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			Preliminary Navigation Hazard Analysis.
Page 6	N/A	*"With regard to Bathymetry and Charted Depths, there is some conflicting information in the report. Paragraph 18.3.8 states that the riverbed is between -7mCD and -9mCD in proximity to the location of the Proposed Jetty and paragraph 18.3.9 states that charted depths alongside currently range between +4mCD and -4.5mCD, depending on the location of the proposed jetty. This is not clear as within the report there is no definition of where the proposed jetty will be, and therefore no detailed information on the level of dredging that may be required as part of the project, although there is a reference in paragraph 2.2.57 that a water depth of approx. 9m will be required for all-tide access. Related to this it is considered that publicly available PLA chart information should be used to present the existing depths in this area in a more straightforward way than currently shown."*	In regard to Bathymetry and Charted Depths, text within this chapter has been updated to accurately and correctly detail bed levels within the area of the Proposed Jetty.
Page 6	N/A	*"Paragraph 18.3.10 states that in general, Halfway Reach sees lower vessel traffic than much of the rest of the tidal area of the River Thames. To confirm, the PLA consider that this area is a busy reach, with active berths along both banks operating daily, as well as transiting traffic for further upriver as shown in figure 18-2 (Bathymetric Survey). Future projected growth includes more cruise ship and other larger craft transiting upriver to Greenwich and further through this area. To confirm there is also limited available deep water in this reach (circa 183m wide) and*	The PLA was presented with vessel frequency traffic data across the River Thames by NASH Maritime during consultation and agreed Halfway Reach was comparatively quiet, relative to other areas of the River Thames.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		around Jenningtree Point which creates pinch points at some states of tide."	
Page 7	N/A	*"With regard to the potential hydrogen bunkering facilities as part of the proposed jetty for marine vessels, depending on how this will be used will need to be addressed in detail in the associated NRA, including on the potential on whether this facility will be used for other operators separate to the applicant."*	As described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer included in the scope of the Proposed Scheme.
Page 7	N/A	*"Paragraph 18.6.2 refers to the PLA pilotage directions with regard to the proposed design vessel for the Proposed Scheme. Whilst this is welcome consideration must also be given to the Code of Practice for Ship Towage Operations on the Thames for tug requirements."*	Code of Practice for Ship Towage Operations on the Thames has been included in **Table 19-1** of this technical chapter.
Page 7	N/A	*"Welcome that it is recognised in paragraph 18.6.2 that appropriate riparian life-saving equipment will be considered in line with PLA requirements. For information, the provision of appropriate riparian life-saving equipment should be provided in line with the PLA's 'a safer riverside' guidance for development on and alongside the tidal Thames."*	A Safer Riverside has been added to this document as relevant guidance to the assessment, see **Table 19-1** for details.
Page 7	N/A	*"Finally, under the references section of Chapter 18, to confirm that document reference 18.19 (PLA - Navigational Risk Assessment – Guidance to Operators and Owners) is not for river structures such as the proposed jetty but rather for the owners/operators of vessels carrying out NRAs for their boats."*	Noted.

19.3.3. **Table 19-3** provides a summary of the consultation and engagement undertaken to inform the marine navigation assessment to date.

Table 19-3: Marine Navigation Consultation and Engagement Summary

Date and Method of Consultation	Consultee	Summary of Key Topics Discussed and Key Outcomes
22nd July 2022, Meeting	PLA	Review of pNRA scope and methodology.
9th August 2022, Meeting	PLA	Validation of baseline navigational environment and review the identified preliminary hazards and key navigational matters. Discuss next steps including ship bridge simulations and the pNRA.
22nd Sep 2022, Meeting	PLA	Presentation and discussion of the initial pNHA findings, and associated works which had been undertaken up to that point. Information presented was an early iteration of **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)**. Scope of pNRA agreed between NASH Maritime, WSP, and the PLA.
29th March 2023, Meeting	PLA	Presentation of the findings of the **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)**, including the preliminary hazard identification. Discussion regarding the options for the location and layout of the Proposed Jetty, including the preferred location and layout. Discussion on the next steps for navigation safety work including the ship bridge simulations and scope of the pNRA (which was agreed). Presentation of analysis illustrating passing cargo and tanker transits in proximity to the preferred location and layout of the Proposed Jetty.
24th and 25th April 2023, Meeting	PLA	Ship bridge simulation runs by PLA pilots to test approach, berthing, and de-berthing at Proposed Jetty.

Date and Method of Consultation	Consultee	Summary of Key Topics Discussed and Key Outcomes
22nd July 2023, Meeting	PLA	Overall Proposed Scheme update and presentation of the developing location and layout of the Proposed Jetty. Discussion around the potential demolition of the Belvedere Power Station Jetty (disused).
22nd August 2023, Meeting	PLA	Consultation with Fords Jetty's vessel operator will be expedited. It was agreed that pellet buoys will be located in the river to mark the location of the Proposed Jetty in order to assess the adequacy of the manoeuvring area for tugs and barges. PLA confirmed that the Sept-22 AIS dataset used for the pNHA meets the PLA's requirements for the pNRA. The PLA confirmed that the Study Area proposed is appropriate for the pNRA. Methodology and consultees for the pNRA were discussed. PLA to provide information on future traffic profile. Significance of passing vessel (hydraulic) interaction to be considered further during the process of the pNRA The PLA confirmed that the pNRA scope was suitable.

19.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

19.4.1. Data from **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)** were used to inform the EIA Scoping Report [22]. This has since been updated as part of the PEIR to consider potential changes in the navigation risk profile of the Proposed Scheme arising from design evolution of the Proposed Scheme since the Scoping Report was prepared, and to incorporate the findings of ship bridge simulations undertaken.

19.4.2. A pNRA will be undertaken and included as a technical appendix to the ES, to assess the construction and operational phases of the Proposed Jetty. It will incorporate analysis, consultation with stakeholders, expert judgement, and local knowledge to establish risk and identify appropriate controls. This pNRA matrix will be based on, and adheres to, the PLA NRA methodology[16], which requires hazards be identified and assessed in relation to hazard likelihood and hazard consequence, to generate a hazard risk score. The risk scoring matrix is shown in **Figure 19-2** below.

Risk Scoring Matrix					
Almost Certain	5	10	15	20	25
Likely	4	8	12	16	20
Possible	3	6	9	12	15
Unlikely	2	4	6	8	10
Rare	1	2	3	4	5
Likelihood	Minor	Moderate	Serious	Very Serious	Severe

Figure 19-2: Marine Navigation - Risk Scoring Matrix

19.4.3. Likelihood classifications range from Rare, to Almost Certain, and describe the probability of a hazard occurring. Consequence classifications range from Minor to Severe, and describe the level of impact the hazard may cause in relation to:

- people;
- environment;
- property;
- reputation; and
- port operations.

POTENTIAL SIGNIFICANT EFFECTS

19.4.4. As set out in the EIA Scoping Report[22], the likely significant effects associated with the construction and operation phases include:

- Construction:
  - Collision:
    - Construction Vessel in collision with cargo vessel/ tanker/ passenger vessel/ recreational vessel/ Cory tug or barge.
    - Collision between third party vessels resulting from action taken to avoid Construction Vessel.
  - Contact:
    - Construction Vessel makes contact with marine construction works.
    - Construction Vessel makes contact with existing infrastructure (e.g., Middleton Jetty).
    - Cory tug and barge makes contact with marine construction works.
    - Third party vessel makes contact with marine construction works.
  - Grounding:
    - Construction Vessel grounds.
    - Cory tug or barge grounds as a result of avoiding Construction Vessel.
  - Breakout:
    - Construction Vessel breakout.
- Operation:
  - Collision:
    - Proposed Scheme vessel in collision with cargo vessel/ tanker/ passenger vessel/ recreational vessel/ Cory tug or barge.
    - Collision between third party vessels resulting from action taken to avoid Proposed Scheme vessels.
  - Contact:
    - Proposed Scheme vessel makes contact with Proposed Jetty.
    - Proposed Scheme vessel makes contact with existing infrastructure (e.g., Middleton Jetty).
    - Cory tug and barge makes contact with Proposed Jetty.
    - Third party vessel makes contact with Proposed Jetty.
  - Grounding:
    - Proposed Scheme vessel grounds.
    - Cory tug or barge grounds as a result of avoiding Proposed Scheme vessels.
  - Breakout:
    - Proposed Scheme vessel breakout.

- ~ Cory tug or barge breakout as a result of marine operations associated with the Proposed Scheme.
- ~ Third party vessel breakout as a result of marine operations associated with the Proposed Scheme.

19.4.5. These will be assessed in the pNRA in line with the legislation, policy and guidance described in **Section 19.2**.

MATTERS SCOPED OUT

19.4.6. There are no matters that have been scoped out of further assessment.

SENSITIVE RECEPTORS

19.4.7. The following sensitive receptors have been identified, as they could be affected during the construction and/or operation phase of the Proposed Scheme:

- Proposed Scheme vessels (including vessels used for maintenance dredging);
- Proposed Scheme construction vessels (including vessels for construction dredging);
- cargo vessels;
- tankers;
- passenger vessels;
- recreational vessels;
- Cory tugs and barges;
- existing infrastructure (e.g., the Middleton Jetty); and
- the Proposed Jetty.

BASELINE DATA COLLECTION

19.4.8. Baseline data has been collected as reported in **Section 2** of **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3).**

ASSESSMENT METHODOLOGY

19.4.9. The scope of the pNRA has been agreed with the PLA. The assessment methodology will be in accordance with the IMO FSA methodology[23] and the Port Marine Safety Code[15]. The methodology adopted is considered to be 'best practice' for port marine operations. It meets the requirements of the PLA's Guidance to Operators and Owners on NRAs[16]. **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)** comprises of two analyses which are detailed below. These analyses will be further developed in the pNRA.

Vessel Traffic Analysis

19.4.10. Vessel traffic analysis has been used to assess the type, number, speed, and frequency of vessels passing through the section of the River Thames surrounding the Proposed Jetty, this is included within in **Section 3** of **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)**.

19.4.11. This information has been used to understand the nature of vessel traffic and how the Proposed Scheme, plus associated vessels, could affect the existing vessels. **Section 3** of **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)** also includes commentary on possible future vessel scenarios.

19.4.12. The pNRA will include an assessment of the increases in vessel movements as a result of the Proposed Scheme.

Ship Bridge Simulations

19.4.13. Models of the River Thames, Proposed Jetty, and a range of atmospheric and weather conditions have been used to simulate real world marine navigation and vessel berthing in a ship simulator. The purpose of these simulations was to highlight any problems or difficulties which could be experienced by vessel masters and pilots during movements up and down the navigation channel, during berthing and de-berthing manoeuvres, and whilst berthed at the Proposed Jetty.

19.4.14. The early iterations of **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)** informed the requirements for ship bridge simulations to inform the ongoing design evolution of the Proposed Jetty. Initial ship bridge simulations were undertaken in April 2023 and the results have been shared with the PLA, as detailed in **Table 19-3**, and in turn informed the most up to date version of **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3).**

SIGNIFICANCE CRITERIA

19.4.15. The significance of potential effects will be evaluated using the PLA NRA methodology[16].

19.5. STUDY AREA

19.5.1. The Study Area for marine navigation is the same for the construction and operation phases of the Proposed Scheme. The Study Area extends upstream past the Thames Water Jetty and downstream past the bend of the River Thames and the Thames Water Barge Moorings. The Study Area is shown in **Figure 19-1: Marine Navigation Study Area with Key Navigational Features (Volume 2)**.

19.6. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

19.6.1. The key sources of information to inform baseline marine navigation conditions are:

- AIS survey data;
- UK Admiralty Charts[24];
- PLA Charts 327 and 328[25];
- PLA Recorded Incidents;
- PLA Risk Assessment methodology[16];
- further PLA Guidance (see **Table 19-1**);
- Marine Accident Investigation Branch for marine incident data [26]; and
- discussions with the PLA and the Applicant).

19.6.2. Halfway Reach leads 1.5 nautical miles (NM) west-north-west from Jenningtree Point (51°30'20N, 0°08'06E) to Crossness Light. Dagenham lies to the north of Halfway Reach and is fronted by several jetties (Dagenham Docks). The Proposed Scheme is located approximately 500m west of Jenningtree Point on the southern bank of the River Thames. **Figure 19-1: Marine Navigation Study Area with Key Navigational Features (Volume 2)** shows the location of the Proposed Scheme.

19.6.3. The section of the River Thames upstream of Halfway Reach is dominated by in-land passenger and recreational vessels; downstream of the Reach is more frequented by commercial shipping associated with Tilbury and London Gateway ports, amongst other facilities. The vessels that most commonly frequent Halfway Reach are inland non-passenger vessels, such as barges travelling to the various local wharfs and jetties, as well as commercial shipping to and from Central London.

19.6.4. The vessel traffic activity in the Study Area can be classified into two major groups:

- Group 1: Powered commercial vessels, which make up the larger vessels and include cargo vessels, tankers, passenger vessels, tugs and port service vessels; and
- Group 2: Recreational vessels made up of powered (e.g cabin cruisers) and unpowered craft (e.g., rowing sculls, canoes, paddle boarders and sailing dinghies).

19.6.5. Analysis of Group 1 (powered commercial vessels) was undertaken using Thames AIS transponder data (commercial vessels are mandated to transmit by Very High Frequency (VHF) various vessel characteristics, such as position, speed, size, and name at prescribed intervals, which can be converted to create vessel tracks).

19.6.6. As AIS is not required on small recreational vessels (although some larger recreational craft voluntarily carry AIS). Analysis of Group 2 vessels (powered and unpowered recreational craft) is more qualitative in nature. Whilst information is available in publications, consultation with river users is necessary to ascertain detailed information on how they utilise the River Thames; the output of this consultation will be presented in the ES as part of the pNRA.

19.6.7. The marine operations to Riverside 1 currently comprise:

- On average ten arrivals and departures at Middleton Jetty a day;
  - four arrivals and departures from an upstream direction; and
  - one arrival and departure from a downstream direction.
- The downstream arrival and departure represent the movement of ash barges from Riverside 1 to a processing facility at Tilbury Docks.
- The upstream arrivals and departures represent the movement of waste from various waste transfer stations in central London to the Middleton Jetty.
- Riverside 1 operation take place on six days a week (Monday-Saturday).
- Approximately 3,120 tug and barge movements per annum to Middleton Jetty.

FUTURE BASELINE

19.6.8. The Thames Vision 2050 goals[27] and 'Future Trade' developed through the Port of London forecasts[28] will add to river traffic but are unlikely to change the type of vessels transiting the Study Area. The projected increase in vessels carrying unitised cargo and decrease in liquid bulk vessels will likely mainly impact terminals downstream of the Study Area and will, consequently, not impact the marine navigation risks of the Proposed Scheme.

19.6.9. When Riverside 2 is operational (2026), the Cory marine operation will expand to comprise:

- 16 vessel arrivals and departures at Middleton Jetty a day;
  - six arrivals and departures from an upstream direction; and
  - two arrivals and departures from a downstream direction.
- All tug and barge vessel movements will occur over one (daytime) tide, other than the downstream ash movement to Tilbury, which is over two tides.
- Operations will continue to take place on six days a week (Monday-Saturday).
- Approximately 4,990 tug and barge movements per annum to Middleton Jetty.

19.6.10. This equates to an increase of approximately 1870 tug and barge movements per annum to Middleton Jetty as opposed to the current baseline scenario (Riverside 1 only).

19.6.11. **Chapter 2: Proposed Scheme Description (Volume 1)** and **Chapter 3: Consideration of Alternatives (Volume 1)** describe the design vessels which will call at the Proposed Jetty, and detail can also be found in **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3).**

19.6.12. The marine operations for Riverside 2 were the subject of an NRA that formed a technical appendix to the ES prepared for Riverside 2[29]. The NRA concluded that "*additional movements associated with the REP would have a Negligible impact upon navigational safety on the River Thames with all hazards remaining inside ALARP (As Low as Reasonably Practicable) with existing risk controls in place".*

19.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

19.7.1. This section sets out the preliminary avoidance, mitigation and compensation measures which are relevant for marine navigation.

19.7.2. Marine vessel traffic within the Study Area is highly controlled and regulated with the PLA administering a suite of baseline risk controls. The Proposed Scheme will be fully compliant with these risk controls during construction and operational phases.

19.7.3. Preliminary navigation hazards have been identified in the **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)**, and early assessments (including ship simulations and design workshops) have been updated as the design of the Proposed Jetty has developed, as reported in **Section 6** of **Appendix 19-1: Preliminary Navigation Hazard Analysis**. In summary, these include:

- Confirmation that the alignment of the Proposed Jetty had been optimised sufficiently to mitigate as far as reasonably practicable the adverse effects of the ebb tide and that sight lines on the approach to the berth were suitable for the PLA pilots at the helm of the vessel.
- The optimum location of the Proposed Jetty with respect to the eastern extremity of Cory operations on the Middleton jetty had been considered. The Riverside 1 Lighterage Team has confirmed that the Proposed Jetty location would not have an adverse effect on existing lighterage operations at the Middleton Jetty (associated with Riverside 1 and Riverside 2). However, it was agreed that, as a precautionary measure, pellet buoys will be placed to simulate the location of the Proposed Jetty and brow in order for tug masters to undertake trial passages to further understand if there is a contact hazard.
- The Proposed Jetty has been positioned within the channel such that a minimal volume of dredging is required, whilst ensuring safe navigation for Proposed Scheme vessels berthing at the Proposed Jetty, and third-party vessels transiting along the navigation channel. This was determined during ship bridge simulations, details of which can be found in **Section 5** of the **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)**.
- Vessel departures from the Proposed Jetty will likely be limited to High Water ±1.5 hours. This is in part due to the optimised dredge depth for the berthing pocket, to provide an appropriate under keel clearance for the identified design vessel with the greatest draft.
- Assessment of limiting wind conditions for berthing were assessed by ship bridge simulations.
- Ship bridge simulations confirmed that no significant ship handling issues were identified, and sight lines were not felt to be an issue.

19.7.4. Recommendations and observations were made during the ship bridge simulations (as reported in **Section 5** of **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)** and these will be taken into consideration in the ongoing design evolution.

19.7.5. The design of the Proposed Jetty will incorporate riparian lifesaving equipment in line with statutory requirements and the PLA's Guidance 'A Safer Riverside'[30].

19.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

19.8.1. This section details the preliminary assessment of impacts and effects for the Proposed Scheme, considering the embedded design, mitigation and enhancement measures detailed in **Section 19.7**.

19.8.2. The two options for the construction programme (as described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**) do not affect the navigation assessment as it is not proposed to transport landside construction materials by river.

19.8.3. The demolition or retention of the Belvedere Power Station Jetty (disused) will not change the preliminary assessment of impacts and effects reported within this technical chapter, as it is not in the path of any Proposed Scheme vessel (during either the construction or operational phases), or tugs navigating to the proposed tug mooring, further detail is provided in **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)**. This approach will be kept under review and re-considered for the ES, taking into account any comments raised at statutory consultation. If it is decided that the Belvedere Power Station Jetty (disused) will be demolished, a specific navigation risk assessment will be required for this activity.

ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

19.8.4. **Section 6** of **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)** identifies the preliminary hazards associated with the construction and operation of the Proposed Jetty. Four principal hazard types (or 'potential significant effects') were identified (collision, contact, grounding, and breakout) and considered for each of the vessel categories. The hazards are summarised in **Section 19.3** of this chapter and in **Table 6** of **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)**.

19.8.5. No unacceptable risks have currently been identified, although the following matters will require further consideration in the pNRA:

- positioning of additional Cory barge moorings (**Section 6** of the **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)**);
- implications of an increased number of passenger or other vessel transits within the Study Area;
- potential for increased congestion given the high water tidal restrictions, (**Section 6** of the **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)**);
- proximity of the moored tanker and Proposed Jetty to Ro-Ro vessels arriving/departing the Fords Jetty (**Section 6** of the **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)**);
- consultation with the Fords Jetty vessel operator to understand the full impact of the proposed jetty location on the Fords Jetty Ro-Ro operation the output of this consultation will be presented in the ES as part of the pNRA;

- tug and barge trials to assess the extent to which the Proposed Jetty location would constitute a contact hazard for existing lighterage operations at the Middleton Jetty (associated with Riverside 1 and in-time Riverside 2); and
- assessment of the hydrodynamic effect of close-passing large ships on tankers moored at the Proposed Jetty.

19.8.6. The above will be included within the pNRA that will be undertaken to inform the ES. The pNRA will include a quantitative risk assessment and will be based on a worst-case scenario in terms of vessel size and number of vessel movements. It is expected that the risks will be reduced to ALARP through future design evolution and appropriate control measures.

19.8.7. The pNRA scope has been agreed with the PLA.

19.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

19.9.1. This section sets out the additional mitigation and compensation measures that are relevant for marine navigation.

CONSTRUCTION PHASE

19.9.2. The pNRA is yet to be undertaken, but it is anticipated that, for the construction phase, the maximum extent of marine plant would be assessed and agreed, and that additional measures would be recommended, which might include (but are not limited to) operational limits, deconfliction of vessel movements, abort points and contingency anchorages, a dedicated safety vessel, appropriate site lighting, promulgation of Notice to Mariners, detailed passage plans, and additional safety moorings to prevent breakout of marine plant.

OPERATION PHASE

19.9.3. Preliminary risk control measures have been identified for the operational phase and are reported in **Section 6** of the **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)**. These include (but may not be limited to):

- Defining operational limits of uncontrollable factors to ensure safe and efficient travel, berthing, and loading operations, above which such operations will cease until levels are back within acceptable tolerances will be determined. Such limits could include:
  - Wind speed and direction;
  - Height of tide;
  - Tidal stream; and
  - Visibility.

- Defining Operational Limits of controllable factors to ensure safe and efficient travel, berthing, and loading operations, which if not met, will cause a cease in operations until met. Such limits could include:
  - Minimum under keel clearance within channel and berth pocket;
  - Tug assistance; and
  - Tidal state at time of arrival and departure.
- Deconfliction of operations to avoid congestion or close calls within the authorised channel, involving regular communication with Proposed Scheme operators, third party operators in the Study Area, including Riverside 1 and Riverside 2. This will be achieved using existing VTS, Port Passage Plans, and marine radio, to ensure vessel movements are spaced as much as if practicable for all parties. The option to hold Cory tug and barge operations at the eastern extremity of the Middleton Jetty should be considered whilst the Proposed Scheme vessel arrives and/or departs the Proposed Jetty.
- Assigning abort points and contingency anchorages within the River Thames, which can be used if a vessel experiences difficulties whilst enroute or manoeuvring to berth at the Proposed Jetty.
- Careful positioning of the Proposed Jetty structures and associated equipment to reduce the likelihood of an impact and limit the consequence should one occur.
- The Proposed Jetty will be able to facilitate the berthing of Riverside 1 and Riverside 2 tugs via a landing pontoon that will be located at the rear of the Proposed Jetty so as not to interfere with vessel movements on the LCO_2 export operations.

19.9.4. A dynamic mooring analysis will also be required to assess forces on the moored vessel and jetty structure due to passing vessels, but this will be undertaken prior to the commencement of operation of the Proposed Jetty.

19.9.5. The installation of a navigation mark in line with the Proposed Jetty and to the north of the authorised channel will be considered to indicate the boundary of navigable water available during swinging.

19.9.6. The recommendations of the **Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3)** will be incorporated into the ongoing design evolution prior to the DCO application. These include vessel approach angles, location and design of berthing infrastructure, consideration of a shore gangway, and consideration of mooring dolphin locations with respect to line length and tidal variations.

19.10. MONITORING

19.10.1. No monitoring is expected to be required during the construction phase.

19.10.2. Monitoring during the operation phase will be undertaken which might include the following methods and techniques:

- London VTS Channels Marine-band VHF radio frequencies are a source of live updates and information for users of the River Thames, and provide a means for vessel crew to communicate with other vessels and shore station (e.g. ports, locks, bridges and marinas) on operational, navigation and safety matters. Listening to the appropriate radio channel will provide a picture of vessel traffic, which is important for operational safety.
- AIS systems can be used to monitor the location, heading and other details of vessels on the Thames. This system is not mandatory for all vessels, but most vessels navigating this section of the River Thames will carry it.
- AIS tracks can be recorded and collated to produce a range of swept paths, which can analysed to show longer term vessel movements in an area. This analysis can be used to show routes and transit frequencies for different vessel classes and, from an individual vessel though to all vessels over a certain time period.
- Numbers of non-AIS equipped vessels such as recreational and leisure craft, used by more casual river users such as rowing clubs, for example, may be captured using CCTV positioned on or around the jetty, or by consultation with such groups to ascertain their weekly or monthly activities in the area.

19.11. RESIDUAL EFFECTS

19.11.1. Residual effects will be identified as part of the pNRA and presented as part of the ES.

19.12. NEXT STEPS

19.12.1. Further work to be completed and included in the ES comprises:

- The scope of the marine navigation assessment, including the pNRA, will be further developed and refined based on any relevant responses to the Statutory Consultation.
- Further modelling of the infrastructure and all applicable environmental conditions will be undertaken to ensure that the navigation to and from, and usage of, the Proposed Jetty is safe and suitable for both the Applicant, and all other river users.
- The following activities will be undertaken as part of the pNRA and the output of which will be presented within the ES:
  - continued in-depth stakeholder engagement, with stakeholders such as commercial shipping companies and recreational vessel groups;
  - risk assessment for the construction, operation, and decommissioning phases of the Proposed Scheme, including a comprehensive risk matrix and control measures workshop;
  - Thames traffic risk modelling, to define, and analyse baseline and future risks; and;
  - commercial shipping assessment to determine and impacts to shipping in the areas as a result of the Proposed Scheme.

19.13. LIMITATIONS AND ASSUMPTIONS

19.13.1. This section outlines the limitations, uncertainties, and assumptions made in undertaking the marine navigation assessment reported in this chapter.

- The information presented within this chapter is based on the information available and responses received at the time of preparation.

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DECARBONISATION

CHAPTER 20: MAJOR ACCIDENTS AND DISASTERS

Cory Decarbonisation Project

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FIGURE (MAIN TEXT ONLY)

TABLE

20. MAJOR ACCIDENTS AND DISASTERS

20.1. INTRODUCTION

20.1.1. This chapter reports the preliminary assessment of the vulnerability of the Proposed Scheme to major accidents and disasters (MA&D) during construction and operation and describes:

- relevant policy, legislation and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operational phase.

20.1.2. Where appropriate, this chapter includes the further mitigation measures required to prevent, reduce or offset any significant adverse effects, the preparedness for and proposed response to emergencies, and the expected residual effects after these measures have been adopted.

20.1.3. This chapter (and its associated figures and appendices) is intended to be read as part of the wider PEIR, with particular reference to:

- **Chapter 5: Air Quality (Volume 1);**
- **Chapter 7: Terrestrial Biodiversity (Volume 1);**
- **Chapter 8: Marine Biodiversity (Volume 1);**
- **Chapter 11: Water (Volume 1);**
- **Chapter 12: Climate Resilience (Volume 1);**
- **Chapter 14: Population, Health and Land Use (Volume 1);**
- **Chapter 17: Ground Conditions (Volume 1);**
- **Chapter 18: Landside Transport (Volume 1);** and
- **Chapter 19: Marine Navigation (Volume 1).**

20.1.4. The above chapters also outline the proposed measures to prevent or mitigate significant effects and where they have identified emergency scenarios, provide details of the preparedness for, and proposed response.

20.2. POLICY, LEGISLATION AND GUIDANCE

20.2.1. The policy, legislation and guidance relevant to the assessment of MA&D for the Proposed Scheme is detailed in **Table 20-1**.

Table 20-1: MA&D Summary of Key Policy, Legislation and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011[1]	Sets out the Government's policy for delivery of major energy infrastructure and is currently the primary basis for decision making of applications within the Planning Act 2008 regime. Paragraph 4.11.4 includes reference to the need to *"prevent, control and mitigate major accidents".*
Draft Overarching National Policy Statement (NPS) for Energy EN-1 2023[2]	This Draft Overarching National Policy Statement for Energy (EN-1) is part of a suite of draft NPSs issued by the Secretary of State of DESNZ. It sets out the government's policy for delivery of major energy infrastructure and will likely replace the 2011 NPSs by the time the application for the Proposed Scheme is submitted. Paragraph 4.12.7 contains similar wording to the 2011 NPS with regards to the Secretary of State assessing whether the inherent features of the design are sufficient to prevent, control and mitigate major accidents.
National Planning Policy Framework (NPPF) 2023[3]	The NPPF sets out the Government's planning policies for England and how these should be applied, with the following paragraphs relating to MA&D: • Paragraph 45 states *"Local planning authorities should consult the appropriate bodies when considering applications for the siting of, or changes to, major hazard sites, installations or pipelines, or for development around them".* • Paragraph 97 states: *"Planning policies and decisions should promote public safety and take into account wider security and defence requirements by:* *a) anticipating and addressing possible malicious threats and natural hazards, especially in locations where large numbers of people are expected to congregate. … This includes appropriate and proportionate steps that can be taken to reduce vulnerability, increase resilience and ensure public safety and security; and* *b) recognising and supporting development required for operational defence and security purposes and ensuring that operational sites are not affected adversely by the impact of other development proposed in the area".*

Policy, Legislation or Guidance	Description
The London Plan 2021[4]	The Spatial Development Strategy for Greater London setting out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policy D11 of the London Plan is the key policy specific to MA&D within Greater London, which states that the: "*Mayor will use his convening power to work with relevant partners and stakeholders to ensure and maintain a safe and secure environment in London that is resilient against emergencies including fire, flood, weather, terrorism and related hazards as set out in the London Risk Register*".
The Bexley Local Plan 2023[5]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development across the Borough. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. Policy DP28: Contaminated Land and Development and Storage of Hazardous Substances identifies that "*Development proposals for hazardous installations and development proposals within the relevant consultation zones for existing hazardous installations must consult with the Health and Safety Executive*".
London Environment Strategy 2018[6]	The London Environment Strategy seeks to ensure that London will become a "*zero carbon city by 2050*" by setting out policies and proposals in seven policy areas to address environmental challenges, including the transition to a low carbon circular economy. The London Environment Strategy does not specifically consider MA&D. However, Policy 8.1.2 makes the commitment to: "*Develop, refine and monitor plans and indicators of London's resilience to severe weather and longer-term climate change impacts on flooding, heat risk and water pollution".*
Legislation	
Infrastructure Planning (Environmental Impact Assessment) Regulations 2017[7]	The Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017 (the 'EIA Regulations') cover the process of EIA in the context of Nationally Significant Infrastructure Projects. They apply the amended EU Directive 2014/52/EU. Schedule 4 Paragraph 5(d) of the EIA Regulations requires: • "*A description of the likely significant effects of the development on the environment resulting from … the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)*".

Policy, Legislation or Guidance	Description
	Schedule 4, Paragraph 8 of the EIA Regulations requires: • A description of the expected significant adverse effects of the Proposed Scheme on the environment deriving from the vulnerability of the Proposed Scheme to risks of MA&D that are relevant to the project concerned. • If appropriate, a description of the measures envisaged to prevent or mitigate the significant adverse effects of major accidents and/or disasters on the environment and details of the preparedness for and proposed response to such emergencies.
Health and Safety at Work etc. Act 1974 (c. 37)[8]	The Act provides the framework for the regulation of workplace health and safety in the UK. It provides a legal framework for the provision of safe plant and equipment and prevention of harm to people from occupational hazards present in a workplace, including emergencies, which may affect those offsite or visiting the Proposed Scheme.
Construction (Design and Management) (CDM) Regulations 2015[9]	These Regulations place legal duties on almost all parties involved in construction work, with specific duties on clients, designers and contractors, so that health and safety is considered throughout the life of a construction project from inception to demolition and removal. The client, designer(s) and contractor(s) must avoid foreseeable risks, so far as is reasonably practicable, by eliminating hazards associated with the design, construction, operation and maintenance of the Proposed Scheme. The Regulations ensure that mechanisms are in place to continually identify, evaluate and manage safety risks throughout the design, construction and operation phases of the Proposed Scheme. Many of the risks identified and managed at the detailed design phase also serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction and operation phases.
Control of Major Accident Hazards (COMAH) Regulations 2015[10]	The purpose of the COMAH Regulations is to prevent major accidents involving dangerous substances and limit the consequences to people and the environment of any accidents which do occur. There are at least four COMAH sites within a 5km radius of the Proposed Scheme.

Policy, Legislation or Guidance	Description
The Planning (Hazardous Substances) Regulations 2015[11]	These Regulations transpose the land-use planning requirements of the European Seveso III Directive and relate to the way hazardous substances consents operate, and the way in which the planning system reduces the likelihood and impact of major accidents. Hazardous substance consents focus on ensuring the safety of the public around the consented site from potential major accident hazards. Many of the risks identified and managed at the detailed design phase also serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction and operation phases.
The Supply of Machinery (Safety) Regulations 2008[12]	The Regulations aim to remove technical barriers to trade, in particular products, by harmonising national health and safety provisions applicable to such products when they are first placed on the market or put into service in the European Economic Area. Many of the risks identified and managed in the design of machinery used in and associated with the Proposed Scheme will serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction and operation phases of the Proposed Scheme.
The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR)[13]	DSEAR implements the Chemical Agents Directive 98/24/EC and the Explosive Atmospheres Directive 99/92/EC. DSEAR sets minimum requirements for the protection of staff from fire and explosion risks arising from dangerous substances and potentially explosive atmospheres. Under the regulations, the Proposed Scheme will require that mechanisms are in place to identify, evaluate and manage the risk of a major accident due to loss of containment to as low as reasonably practicable (ALARP). Many of the risks identified and managed will serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction and operation phases of the Proposed Scheme.
The Equipment and Protective Systems for Use in Potentially Explosive Atmospheres	The Regulations implement measures for safety and consumer protection with respect to electrical equipment and any provisions concerning the composition, labelling, marketing, classification or description of electrical equipment intended to be used in potentially explosive atmospheres.

Policy, Legislation or Guidance	Description
Regulations 1996 and 2016[14,15]	The use of the correct level of intrinsically safe equipment and protective systems will likely minimise the likelihood of a large-scale release of CO_2 from the Proposed Scheme and therefore reduce the risk of a major accident.
Occupier's Liability Act 1984 (c.3)[16]	This Act amends the law of England and Wales as to the liability of persons as occupiers of premises for injury suffered by persons other than their visitors. The Act provides a legal framework for the prevention of harm to people from occupational safety and health hazards present on premises under the control of the occupier, including to those visiting the premises. The Proposed Scheme will include premises controlled by the Applicant that will attract visitors who could be impacted by MA&D whilst on/crossing those controlled premises.
The Pipelines Safety Regulations 1996[17]	The purpose of these Regulations is to ensure that pipelines are designed, constructed and operated properly to ensure their integrity and reduce risks.
Guidance	
National Planning Practice Guidance (2021)[18]	Explains the processes and tools that can be used through the planning system in England. There is no specific guidance relating to MA&D.
IEMA: Major Accidents and Disasters in EIA: A Primer 2020[19]	The purpose of the primer is to increase awareness of the MA&D topic and its application within all stages of EIA. The primer outlines an assessment methodology based on known current practice within the UK and provides definitions of key terminology. The Primer is structured around a typical assessment approach and provides a proportionate method for considering major accidents and disasters through the stages of EIA.
'Green Leaves III' Guidelines for Environmental Risk Assessment and Management (2011)[20]	Providing generic guidance for the assessment and management of environmental risks. A cyclical framework for risk management is presented that identifies four main components of risk assessment: • formulating the problem; • carrying out an assessment of the risk; • identifying and appraising the management options available; and • addressing the risk with a risk management strategy. A source-pathway-receptor model is suggested as a tool to assist in risk screening and an example is provided of applying the

Policy, Legislation or Guidance	Description
	following filters to prioritise significant hazards for further investigation: • the plausibility of linkages between the source of a hazard and a receptor; • the relative potency of a hazard, availability of a pathway, or vulnerability of a receptor; • the likelihood of an event, based on historic occurrence or of changed circumstances; or • a view on the performance of current risk management measures that, if they were to fail, may increase the potential for future harm.
Guideline – Environmental Risk Tolerability for COMAH Establishments 2013[21]	Providing generic guidance on how to undertake environmental risk assessments required by the COMAH Regulations. It provides: • A definition of the types of harm that should be considered in an environmental risk assessment, and how the harm should be characterised for the assessment. In this context, the level of environmental harm that would be considered serious has been defined for various different receptor types in terms of the combination of the: – extent (the area/distance); – severity (the degree of harm within the area of impact); and – duration (the recovery period). For environmental harm to be considered serious then all parameters must exceed the receptor thresholds as defined in this guideline. The thresholds reflect expert opinion on levels of harm that would be considered serious, with consideration to various receptor specific areas of legislation (such as the Water Framework[22], Habitats[23] and Environmental Liability[24] Directives). The guideline also provides: • a definition of the risk criteria to be used in assessing the tolerability of the environmental risk from an establishment and, where appropriate, individual scenarios; and • guidance on how the risks may be evaluated.
ISO 31000:2018 Risk Management – Guidelines 2018[25]	This guidance identifies principles that need to be satisfied to make risk management effective. If the standards are adopted and applied the management of any risk should help minimise losses, improve resilience, improve controls and improve the identification of opportunities and threats.

Policy, Legislation or Guidance	Description
	The ISO standard states that when defining risk criteria, the following factors should be considered: • the nature and types of causes and consequences that can occur and how they will be measured; • how likelihood will be defined; • the timeframe(s) of the likelihood or consequence(s); • how the level of risk is to be determined; • the views of stakeholders; • the level at which risk becomes acceptable or tolerable; and • whether combinations of multiple risks should be considered and, if so how, and which combinations should be considered.

20.3. SCOPING OPINION AND CONSULTATION

20.3.1. An EIA Scoping Opinion[26] was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 26th May 2023. The responses from the Planning Inspectorate and statutory consultees in relation to MA&D and how these requirements should be addressed by the Applicant are set out in **Table 20-2** below.

Table 20-2: Summary of the EIA Scoping Opinion[26] in relation to MA&D

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Planning Inspectorate			
3.16.1	• Low likelihood and low consequence events; • Highly likely and low consequence events; and • High likelihood and high consequence events.	*"The Inspectorate is content that low likelihood and low consequence events can be scoped out.* *The Scoping Report does not provide a description of the likelihood and consequence of each event in Table 19-4, or a detailed justification for the proposed scoping out of 'highly likely and low consequence' and 'high likelihood and high consequence' events.* *In the absence of this information, the Inspectorate is not in a position to agree to a complete scope out of 'highly likely and low consequence' and 'high likelihood and high consequence' events, but has commented below on the proposals to scope out specific risks/ hazards".*	Table 19-4 of the EIA Scoping Report[27] is a screening exercise to determine which MA&D types are relevant to the Proposed Scheme and therefore require further assessment in the ES. The likelihood and consequence of the MA&D types scoped in will be assessed in this PEIR and in the ES. **Section 20.4** and **Figure 20-1: Graphical Representation of Major Accidents and Disasters Consequence Significance** of this PEIR provides the justification for not undertaking an assessment of 'high likelihood and low consequence' and 'high likelihood and high consequence' events.
3.16.2	Risk of major accidents and disasters (MAD) resulting from the following natural hazards – construction and operation:	*"The Inspectorate is in agreement that an assessment of these matters in relation to MAD can be scoped out for the construction phase.* *However, based on the identified vulnerability of the operational Proposed Development to climate hazards identified in Scoping Report Chapter 11*	An assessment of the potential impacts associated with flooding, extreme temperature events, gales/ winds, storms and sea level rise/storm surges during operation is provided in

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
	• Pluvial flooding; • Groundwater flooding; • Storms and gales; • Wave surges; and • Extreme temperatures.	*(Climate Resilience) and Chapter 19 (MAD), the Inspectorate is not in agreement that an assessment of these matters in relation to MAD can be scoped out for the operation phase".*	**Chapter 12: Climate Resilience (Volume 1)**.
3.16.3	Risk of major accidents and disasters resulting from the following technological or manmade hazards – construction and operation: • Major Accident Hazard Pipelines (MAHPs).	*"Table 19-4 of the Scoping Report states that there are no MAHPs within 1km of the Proposed Development. However, the Inspectorate notes the scoping consultation response from Northern Gas (see Appendix 2 of this Opinion), which indicates that MAPHs may be affected by the Proposed Development.* *The Inspectorate does not consider sufficient evidence has been provided to scope this matter out of the assessment. The ES MAD Chapter should assess risks to or from the Proposed Development from MAHPs where significant effects are likely".*	The design of the Proposed Scheme has been informed by the location of gas pipelines managed and operated by National Gas, Cadent Gas and Southern Gas Networks Plc. The MA&D assessment will consider the potential risks associated with these gas pipelines and this will be presented within the ES. The Applicant has contacted Northern Gas Networks to understand the location of the pipelines referred to their EIA Scoping Opinion[26] response with a view to ensuring that these align with those already known to the Applicant. Northern Gas Networks has confirmed it does not cover the area of or around the Site. Contact has also been made with Southern Gas Networks to confirm pipeline locations.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
			Any pipelines which are identified within the Study Area will be considered in the Risk Record presented within the ES.
3.16.4	Risk of major accidents and disasters resulting from the following industrial/ urban accident hazards – construction and operation: • Fires.	*"The Scoping Report explains that during construction, standard control measures would be implemented by the appointed contractor to manage the risk of fire. The Inspectorate is content that the risk of fire during construction is not likely to result in significant effects in terms of MAD and can be scoped out.* *However, the Inspectorate considers that the ES should assess the risk of fire/ explosion from the release of flammable gases (including CO_2 and hydrogen) and from the battery energy storage systems (if this option is pursued) during operation, including any measures designed to minimise impacts on the environment in the event of such an occurrence. Any mitigation measures relevant to safety risks associated with fire/ explosion, should be described in the ES (with reference to the proposed emergency preparedness and response plan, where relevant) and their delivery secured through the dDCO. Effort should be made to agree any necessary measures with relevant consultation bodies".*	As described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project and the battery energy storage system are no longer included in the scope of the Proposed Scheme. As CO_2 is not flammable, the risk of fires does not need to be considered during the operation phase. The potential consequences of a release of CO_2 have been considered in this PEIR and will be considered in the ES. This will include consideration of the proposed mitigation measures and reference will be made to the EPRP, where appropriate.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.16.5	Risk of major accidents and disasters resulting from the following technological or manmade hazards – construction and operation: • Road traffic accidents.	*"The Inspectorate is in agreement that an assessment of road traffic accidents in relation to MAD can be scoped out for the construction phase.* *However, while export of potentially hazardous materials such as liquified gases (CO_2 and hydrogen) via road remains an option, the Inspectorate is not in a position to agree that risks of MAD resulting from road traffic accidents during operation can be scoped out".*	As described in **Chapter 1: Introduction (Volume 1)** the Hydrogen Project is no longer included in the scope of the Proposed Scheme. CO_2 will only be transported by boat and not via road. Therefore, road traffic accidents will not be considered in the assessment for the operational phase.
3.16.6	Risk of major accidents and disasters resulting from the following natural hazards – construction and operation: • Poor air quality. Risk of major accidents and disasters resulting from the following technological or manmade hazards – construction and operation: • Air pollution accidents.	*"The Inspectorate is in agreement that an assessment of poor air quality and air pollution accidents in relation to MAD can be scoped out for the construction phase.* *However, the Inspectorate is not in agreement that an assessment of poor air quality and air pollution accidents in relation to MAD can be scoped out of the assessment for the operational phase. It is considered that the Proposed Development could result in new emission sources and pollutants, and potentially pollution incidents related to the hazardous materials stored on site".*	Any new emission sources and pollutants will be managed via an Environmental Permit for Riverside 1 and Riverside 2 (at the time of writing this PEIR Riverside 2 is under construction). The Environmental Permit will limit the discharge of pollutants (addressing both normal and abnormal operating conditions) ensuring appropriate pollution control measures are in place. The Environmental Permit will also address potential fugitive emissions. Therefore, further assessment of air quality and air pollution accidents during operation is not considered necessary.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.16.7	Risk of major accidents and disasters resulting from the following technological or manmade hazards - construction: • Land pollution accidents and water pollution accidents.	*"Based on the reasoning and evidence presented in the Scoping Report and the implementation of standard pollution control measures, the Inspectorate is in agreement that the risk of land pollution accidents and water pollution accidents during construction are not likely to result in significant effects in terms of MAD. These matters can be scoped out".*	No response required.
3.16.8	Risk of major accidents and disasters resulting from the following technological or manmade hazards – construction and operation: • UXO.	*"In line with comments in Table 2.1 above, the Inspectorate considers that the ES should include a high-level assessment of risks of major accidents and disasters from UXO during construction and operation".*	A high-level assessment of the potential impacts associated with the risk of encountering UXO in both the marine and terrestrial area of the Site is provided in **Table 17-14: Conceptual Site Model of Chapter 17: Ground Conditions and Soils (Volume 1).** An assessment of the risk of a major accident and/or disaster as a result of encountering UXO during construction has been presented in **Appendix 20-2: PEIR Risk Record (Volume 3)**.
3.16.9	Risk of major accidents and disasters resulting from the following natural hazards – construction and operation:	*"Based on the reasoning and evidence presented in the Scoping Report, the Inspectorate is content that risks to or from the Proposed Development from these matters are not likely to result in significant*	No response required.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
	• Geophysical – earthquakes, volcanic activity, landslides, sinkholes, tsunamis; • Hydrological – avalanches; • Climatological – cyclones, hurricanes, typhoons, thunderstorms, droughts, severe space weather (solar flares, solar energetic particles, coronal mass ejections), fog, wildfires; and • Biological - disease epidemics, animal diseases, plants (non native species).	*effects. These matters can be scoped out of the assessment".*	
3.16.10	Risk of major accidents and disasters resulting from the following technological or manmade hazards – construction and operation:	*"Based on the reasoning and evidence presented in the Scoping Report, the Inspectorate is content that risks to or from the Proposed Development from these matters are not likely to result in significant effects. These matters can be scoped out of the assessment".*	No response required.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
	• Societal - demonstrations, societal or economic damage, humanitarian disasters (assistance, political and military constraints, security risks), famine, displaced population; • Industrial or urban accidents - nuclear sites, fuel storage, dam breaches, mines and storage caverns; • Transport accidents - rail and aviation; • Utilities failures - electricity failure, gas failure, water failure, sewage failure; • Malicious attacks - terrorist and malicious attacks (chemical, biological, radiological, nuclear, transport,		

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
	crowds, cyber, infrastructure); and • Engineering failure and accidents - bridge failure, mast collapse, demolition accidents and tunnel failure/ fire.		
3.16.11	Flood Defence Failure	*"It is noted that an assessment of the failure of flood defences is scoped in for both the construction and operational phases. The Scoping Report notes that Environment Agency maintained flood defences are within the site boundary. The ES should detail how works which may interfere with the flood defences have been avoided, and where they are unavoidable, any permissions needed to alter the flood defences and the consequences of doing so, for example in relation to flood risk on and off site".*	The risks associated with flood defence failure will be considered in this technical chapter and the ES.
3.16.12	Consultees	*"The Scoping Report details that the London Borough of Bexley would be the main consultee regarding the assessment scope and methodology. The Inspectorate also considers that other statutory consultees would be of relevance, in particular the Environment Agency, the UKHSA and the Health and Safety Executive".*	The Environment Agency, the UKHSA and the Health and Safety Executive will be included in the Statutory Consultation for this PEIR.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.16.13	MAD to and from the Proposed Scheme	*"The Scoping Report does not differentiate between where a hazard is assessed in terms the vulnerability of the Proposed Development to MAD or the potential for the Proposed Development to lead to MAD. The Inspectorate considers that this should be clearly defined within the ES."*	This technical chapter has, and the ES will, clearly define which MA&D events could affect the Proposed Scheme and which MA&D events the Proposed Scheme could lead to. **Appendix 20-2: PEIR Risk Record (Volume 3)** sets out the MA&D events that have been considered and identifies whether the MA&D event is from an external or internal factor.
3.16.14	Cross-referencing	*"To avoid unnecessary duplication the Inspectorate is content that assessments relevant to MAD may, where relevant, be presented in other ES aspect Chapters. The Applicant should provide clear cross-referencing in the Major Accidents and Disasters ES aspect chapter to where the assessments are located."*	Where necessary, cross reference to other technical chapters has been made. Cross references will also be provided within the ES.
Northern Gas Networks			
N/A	Major Accident Hazard Pipelines	*"NGN may have a number of gas assets in the vicinity of some of the identified "site development" locations. It is a possibility that some of these sites could be recorded as Major Accident Hazard Pipelines (MAHP), whilst other sites could contain High Pressure gas and as such there are Industry recognised restrictions associated to these*	The design of the Proposed Scheme has been informed by the location of gas pipelines managed and operated by National Gas, Cadent Gas and Southern Gas Networks Plc. The MA&D assessment will consider the potential risks associated with

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		installations which would effectively preclude close and certain types of development. The regulations now include "Population Density Restrictions" or limits within certain distances of some of our "HP" assets. *The gas assets mentioned above form part of the Northern Gas Networks "bulk supply" High Pressure Gas Transmission" system and are registered with the HSE as Major Accident Hazard Pipelines.* *Any damage or disruption to these assets is likely to give rise to grave safety, environmental and security of supply issues.* *NGN would expect you or anyone involved with the site (or any future developer) to take these restrictions into account and apply them as necessary in consultation with ourselves. We would be happy to discuss specific sites further or provide more details at your locations as necessary.* *If you give specific site locations, we would be happy to provide gas maps of the area which include the locations of our assets.* *(In terms of High Pressure gas pipelines, the routes of our MAHP's have already been lodged with members of the local Council's Planning Department)"*	these gas pipelines and this will be presented within the ES. The Applicant has contacted Northern Gas Networks to understand the location of the pipelines referred to here with a view to ensuring that these align with those already known to the Applicant. Northern Gas Networks has confirmed that it does not cover the area of or around the Site. Contact has also been made with Southern Gas Networks to confirm pipeline locations. Any pipelines which are identified within the Study Area will be considered in the Risk Record presented within the ES.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
Environment Agency			
N/A	-	*"Table 19-4* • *The Applicant will scope in coastal flooding which is welcomed. However, the Applicant states that the Environment Agency maintain the flood defences when this is in fact the Flood Defence Owner.* • *We welcome the Flood defence failure scoped in."*	Clarification noted, no response required.
London Borough of Bexley			
N/A	-	*"The Council is generally satisfied at the details submitted in this chapter and that the applicant hqas adequately addressed this issue at this stage. The Council would however encourage the applicant to engage with groups such as the London Fire Brigade, Met Police and the GLA's Fire, Resilience and Emergency Planning Committee."*	The Applicant will engage with the relevant groups prior to construction commencing and prior to operation of the Proposed Scheme (including as part of Statutory Consultation).

20.3.2. **Table 20-3** provides a summary of the consultations undertaken to inform the MA&D assessment to date.

Table 20-3: MA&D Consultation and Engagement Summary

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
24th August 2023, Email	Northern Gas Networks	Confirmation of the location of the pipelines referred to in the Scoping Opinion[26]. Northern Gas Networks confirmed that it does not cover the area of or around the Site.
6th September 2023, Email	Southern Gas Networks	The location of gas assets in proximity to the Proposed Scheme.

20.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

20.4.1. The MA&D assessment of the Proposed Scheme has been undertaken in line with the policy, legislation and guidance described in **Section 20.2**.

KEY DEFINITIONS

20.4.2. The definition of key terms used in this chapter are provided in **Table 20-4** below. These definitions have been developed by reference to the definitions used in EU and UK legislation and guidance relevant to major accidents and/or disasters[28,29,20,10,30,31,17,32] as well as professional judgement in the context of the Proposed Scheme.

Table 20-4: MA&D Key Definitions

Term	Definition
(Major) Accident	An event that threatens immediate or delayed serious damage to human health, welfare and/or the environment and requires the use of resources beyond those of the Applicant or its contractors to respond to the event. Serious damage includes the loss of life or permanent injury and/or permanent or long lasting damage to an environmental receptor that cannot be restored through minor clean-up and restoration efforts. The significance of this effect will consider the extent, severity and duration of harm and the sensitivity of the receptor.
Adaptive Capacity	The capacity of receptors to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.
ALARP	"ALARP" stands for "as low as reasonably practicable". Reasonably practicable involves weighing a risk against the trouble, time and money needed to control it. Thus, ALARP describes the level to which the Health & Safety Executive (HSE) expects to see workplace risks controlled.
Consultation Zone	The HSE sets a Consultation Distance (CD) around major hazard sites and major accident hazard pipelines after assessing the risks and likely effects of major accidents at the major hazard site/pipeline. The area enclosed within the CD is referred to as the Consultation Zone and is the area within which there could be potentially significant consequences from major accidents to people (or to the environment). The Local Planning Authority is notified of this CD and has a statutory duty to consult HSE on certain proposed schemes within the zone the CD forms.
Disaster	A naturally occurring phenomenon such as an extreme weather event (for example storm, flood, temperature) or ground-related hazard events (for example subsidence, landslide, earthquake) with the potential to cause an event or situation that meets the definition of a Major Accident as defined above.
External Influencing Factor	A factor that occurs beyond the limits of the Proposed Scheme that may present a risk to the Proposed Scheme, e.g., if an external disaster occurred (e.g., earthquake, COMAH site major accident) it would increase the risk of serious damage to an environmental receptor associated with the Proposed Scheme.
Hazard	Anything with the potential to cause harm, including ill-health and injury, damage to property or the environment; or a combination of these.

Term	Definition
Internal Influencing Factor	A factor that occurs within the limits of the Proposed Scheme that may present a risk to the Proposed Scheme.
Magnitude of Impact	The magnitude of an impact is typically defined by the following factors: • extent – the area over which an effect occurs; • duration – the time for which the effect occurs; • frequency – how often the effect occurs; and • severity – the degree of change relative to existing conditions.
MA&D Group	A MA&D which can be grouped as either a Natural Hazard (Disaster) or Technological or Manmade Hazard (Major Accident).
MA&D Category	A set of values used to categorise events within a related parent MA&D Group.
MA&D Type	A set of values used to sub-categorise events within a MA&D Category.
Risk	The likelihood of an impact occurring combined with effect or consequence(s) of the impact on a receptor if it does occur.
Risk Event	An identified, unplanned event, which is considered relevant to the Proposed Scheme and has the potential to be a Major Accident and/or Disaster subject to assessment of its potential to result in a significant adverse effect on an environmental receptor.
Sensitivity	The sensitivity of a receptor is a function of its value, and capacity to accommodate change reflecting its ability to recover if it is affected. It is typically defined by the following factors: • Adaptability – the degree to which a receptor can avoid, adapt to or recover from an effect. • Tolerance – the ability of a receptor to accommodate temporary or permanent change. • Recoverability – the temporal scale over and extent to which a receptor will recover following an effect.

Term	Definition
Vulnerability	In the context of Infrastructure Planning (Environmental Impact Assessment) Regulations 2017[7] (on the assessment of the effects of certain public and private projects on the environment), the term refers to the 'exposure and resilience' of the Proposed Scheme to the risk of a MA&D. Vulnerability is influenced by sensitivity, adaptive capacity and magnitude of impact.

POTENTIAL SIGNIFICANT EFFECTS

20.4.3. As identified in the EIA Scoping Report[27] and **Appendix 20-1: Major Accidents and Disasters Long List (Volume 3)**, the following MA&D event types are considered further in this assessment (the MA&D categories are included in brackets):

- Construction Phase:
  - Coastal Flooding (hydrological);
  - Fluvial Flooding (hydrological);
  - Major accident hazard chemical sites (industrial and urban accidents);
  - Major accident hazard pipelines (industrial and urban accidents);
  - Waterways (transport accidents); and
  - Flood defence failure (engineering accidents and failures).
- Operation Phase:
  - Coastal Flooding (hydrological);
  - Fluvial Flooding (hydrological);
  - Major accident hazard chemical sites (industrial and urban accidents);
  - Major accident hazard pipelines (industrial and urban accidents);
  - Waterways (transport accidents);
  - Flood defence failure (engineering accidents and failures);
  - Land (pollution accidents); and
  - Water (pollution accidents).

20.4.4. The above MA&D event types have been assessed based on the information currently available and will require review and update in the ES. However, the assessment of major accident hazard pipelines during construction and operation has not been undertaken as information on the location of these pipelines is currently unavailable.

MATTERS SCOPED OUT

20.4.5. The following MA&D event types are those to which the Proposed Scheme is considered unlikely to be vulnerable and therefore have not been considered further in this assessment:

- Construction Phase only:
  - Land (pollution accidents); and
  - Water (pollution accidents).
- Construction and Operation Phase:
  - Earthquakes (geophysical);
  - Volcanic activity (geophysical);
  - Landslides (geophysical);
  - Sinkholes (geophysical);

- Tsunamis (geophysical);
- Pluvial flooding (hydrological);
- Groundwater flooding (hydrological);
- Avalanches (hydrological);
- Cyclones, hurricanes, typhoons, storms and gales (climatological and meteorological);
- Thunderstorms (climatological and meteorological);
- Wave surges (climatological and meteorological);
- Extreme temperatures: heatwaves, low (sub-zero) temperatures and heavy snow (climatological and meteorological);
- Droughts (climatological and meteorological);
- Severe space weather: solar flares (climatological and meteorological):
- Severe space weather: solar energetic particles (climatological and meteorological);
- Severe space weather: coronal mass ejections (climatological and meteorological);
- Fog (climatological and meteorological);
- Wildfires: forest fire, bush/brush, pasture (climatological and meteorological);
- Poor air quality (climatological and meteorological);
- Disease epidemics (biological): viral, bacterial, parasitic, fungal and prion;
- Animal diseases (biological): avian influenza, west nile virus, rabies, foot and mouth and swine fever;
- Plants (biological);
- Extensive public demonstrations which could lead to violence and loss of life (societal);
- Widespread damage to societies and economies (societal);
- The need for large-scale multi-faceted humanitarian assistance (societal);
- The hindrance or prevention of humanitarian assistance by political and military constraints (societal);
- Significant security risks for humanitarian relief workers in some areas (societal);
- Famine (societal);
- Displaced population (societal);
- Nuclear (industrial and urban accidents);
- Fuel storage (industrial and urban accidents);
- Dam breaches (industrial and urban accidents);
- Mines and storage caverns (industrial and urban accidents);
- Fires (industrial and urban accidents);

- Road (transport accidents);
- Rail (transport accidents);
- Aviation (transport accidents);
- Air (pollution accidents);
- Electricity (utilities failures);
- Gas (utilities failures);
- Water supply (utilities failures);
- Sewage system (utilities failures);
- Unexploded ordnance (malicious attacks);
- Attacks chemical biological radiological nuclear (malicious attacks);
- Transport systems (malicious attacks);
- Crowded places (malicious attacks);
- Cyber (malicious attacks);
- Infrastructure (malicious attacks);
- Bridge failure (engineering accidents and failures);
- Mast and tower collapse (engineering accidents and failures);
- Property or bridge demolition accidents (engineering accidents and failures); and
- Tunnel failure/fire (engineering accidents and failures).

SENSITIVE RECEPTORS

20.4.6. In line with Schedule 4 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017[7] ('the EIA Regulations') the following sensitive receptors were considered with respect to MA&D:

- members of the public and local communities;
- infrastructure and the built environment;
- the natural environment, including ecosystems, land and soil quality, air quality, surface and groundwater resources and landscape;
- the historic environment, including archaeology and built heritage; and
- the interaction between the factors above.

20.4.7. The specific potential receptors of effects resulting from MA&D are reported in the relevant other technical chapters as described in **Section 20.1**.

20.4.8. Certain receptors have been excluded from the assessment, for the reasons described in **Table 20-5** below.

Table 20-5: Excluded Receptors

Term	Definition
Staff of the Applicant and/or their suppliers, whether during the construction or operation phase of the Proposed Scheme.	Employer's commitment and obligations to manage risks to employees are addressed in the Health and Safety At Work etc Act 1974[8].
Members of the public who are wilfully trespassing, for example, a breach of the Proposed Scheme's perimeter fencing.	Outside the occupier's legal requirements under the Occupiers' Liability Act 1984[16].

BASELINE DATA COLLECTION

20.4.9. A desk-based data collection exercise has been undertaken, including review of available information, to determine the baseline conditions.

20.4.10. The key sources of information used to determine the baseline for MA&D are:

- National Risk Register of Civil Emergencies[32];
- British Geological Survey (BGS) GeoIndex Onshore[33];
- Tsunamis Hazard Map[34];
- International Disaster Database[35];
- Health and Safety Executive's (HSE) Planning Advice Web App[36];
- HSE's COMAH 2015 Public Information Search[37];
- Ordnance Survey mapping;
- Google aerial and street view maps[38]; and
- Technical topic chapters (**Chapter 5: Air Quality (Volume 1)** to **Chapter 19: Marine Navigation (Volume 1)**).

ASSESSMENT METHODOLOGY

20.4.11. To date, there is no regulatory guidance on how to consider MA&D within the context of EIA. However, the assessment takes account of emerging EIA good practice[39,40,41] which refers to other relevant documentation, including the Cabinet Office's National Risk Register[42].

20.4.12. The assessment of MA&D has been achieved through a review of available documentation and regulatory requirements. The assessment does not involve assessment from 'first principles' as it is recognised that existing legislation and health and safety requirements already identify risks and help to protect human beings and the environment.

20.4.13. The assessment presents any identified risks along with whether these are managed to be ALARP or require further precautionary mitigation actions beyond those already integrated into the design and execution of the Proposed Scheme.

20.4.14. The potential for identified relevant MA&D to result in a significant adverse environmental effect have been evaluated using a risk-based approach. The approach has considered the environmental consequences of a MA&D, the likelihood of these consequences occurring, considering planned design and embedded mitigation, and the acceptability of the subsequent risk to the relevant receptor. The following process has been applied to each of the MA&D categories included for assessment:

- identifying risks;
- screening these risks;
- defining the impact;
- assessing the risk; and
- appraising risk management options.

20.4.15. The Long List in **Appendix 20-1: Major Accidents and Disasters Long List (Volume 3)** provides the justification for the whether risk event types are considered within the assessment.

Identify Risks

20.4.16. The assessed MA&D are considered to be rare events.

20.4.17. Low consequence events, whatever their likelihood, do not meet the definition of MA&D as defined in the IEMA Primer[19]. For example, minor spills which may occur during construction, but will be limited in area and volume and temporary in nature, do not meet the definition of a major accident. Such minor events will be dealt with by the measures included in the OCoCP and do not fall within the scope of this assessment.

20.4.18. High likelihood and high consequence events also do not meet the definition of MA&D as the risk assessment and design process will identify and avoid or design out such risks. In addition, activities which fall into this category are highly regulated to minimise the risk to be ALARP.

20.4.19. This assessment focuses on low likelihood, but potentially high consequence events as illustrated in **Figure 20-1: Graphical Representation of Major Accidents and Disasters Consequence Significance**, which is based on Figure 2 in the IEMA Primer[19].

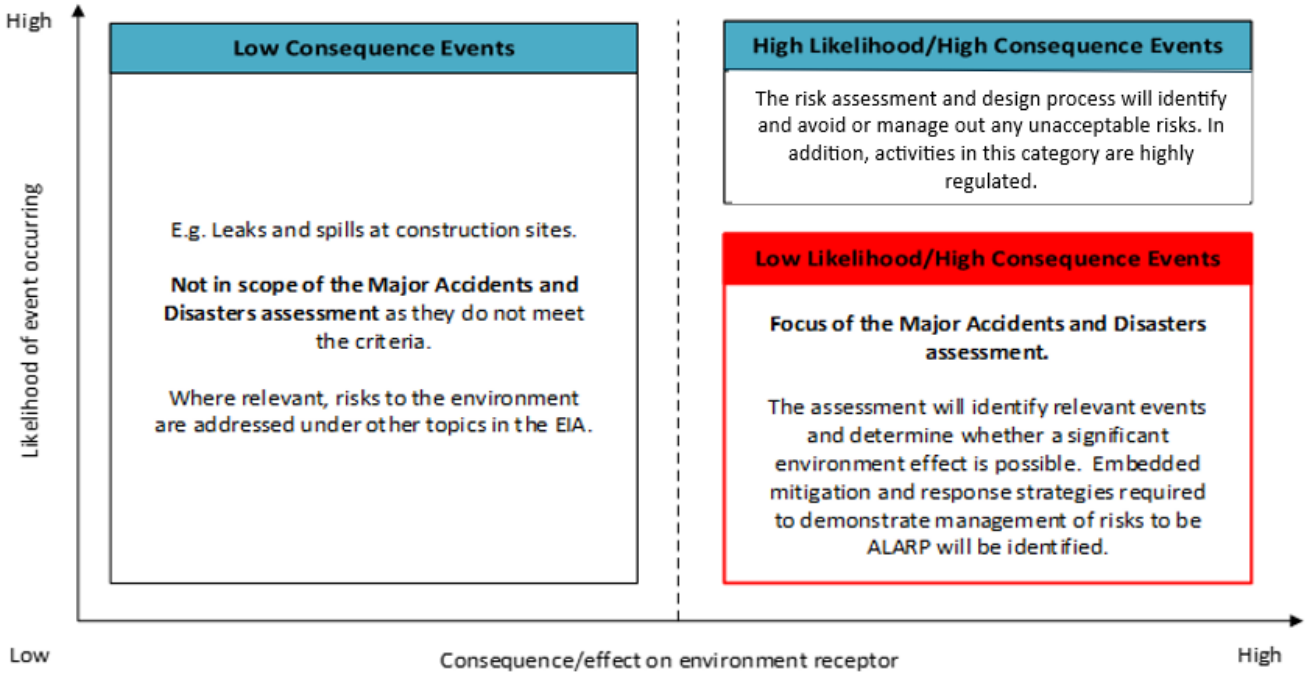

Figure 20-1: Graphical Representation of Major Accidents and Disasters Consequence Significance

20.4.20. Low likelihood events are defined, for the purposes of this assessment, as those which may occur during the lifetime of the Proposed Scheme: no more than once in 10 years for the construction phase; and no more than once in 100 years for the operation phase. This is an upper boundary for low likelihood.

20.4.21. Very low likelihood events are also included in the assessment, which may only occur at most once in every 1,000 years. Mitigation measures will reflect what is reasonable for such rare events, considering their potential consequence, within the guiding principle of risks being ALARP.

20.4.22. High consequence events are considered to lead to a significant adverse effect.

20.4.23. The risk identification process has used existing sources of information, wherever possible, such as risk assessments undertaken for the Proposed Scheme as part of other processes (many of which are required by law) or Risk Events identified within the UK's current National Risk Register[32]. No additional risk assessments have been undertaken and the risk identification activity has focused on collating and reviewing the existing sources of information prepared specifically for the Proposed Scheme.

20.4.24. To identify whether a Risk Event has the potential to be a MA&D event, which also has the potential to have a significant adverse effect on an environmental receptor, three components need to be present: a source, a pathway (between source and receptor) and a receptor. As such, and as recommended by DEFRA[20], the assessment uses the following conceptual model:

- The source is the original cause of the hazard, which has the potential to cause harm;
- The pathway is the route by which the source can reach the receptor; and
- The receptor is the specific component of the environment that could be adversely affected, if the source reaches it.

20.4.25. Risk Events which do not have all three components have been screened out from the assessment.

Screen Risks

20.4.26. The following MA&D screening process has been used to identify those Risk Events that will require further consideration within the assessment:

- Is there a potential source, and/or pathway and/or receptor? If not, no further assessment required;
- Is there a relevant environmental receptor present in the locations where the Risk Event could occur, and a pathway whereby the source of harm can reach the receptor? If not, no further assessment required; and
- Does the potential impact on the environmental receptor meet the definition of a significant adverse effect? If not, no further assessment required.

20.4.27. For those Risk Events which are not screened out during the three-step process, the following assessment methodology has been used. The assessment forms the basis for recommending additional mitigation measures, as appropriate.

Define Impact

20.4.28. Several mechanisms are in place to reduce the vulnerability of the Proposed Scheme to MA&D or to mitigate significant effects on the environment should they occur. All measures to manage and reduce the risk of significant adverse effects occurring due to the vulnerability of the Proposed Scheme to MA&D are considered to be embedded mitigation measures for the purposes of the assessment. It has been assumed that:

- the construction stage(s) of the Proposed Scheme will be managed through the implementation of a Construction Phase Plan (required under the CDM Regulations 2015[9]) and an OCoCP; and
- the design, installation, commissioning, operation and maintenance of plant, drainage systems, equipment, and machinery, including associated systems, will consider Good Engineering Practice.

20.4.29. The measures of relevance to the assessment are described in the relevant technical chapters.

20.4.30. A reasonable worst-case environmental impact(s) has been identified for each Risk Event included for assessment. Impacts have been identified in consultation with relevant disciplines for each environmental factor assessed within this PEIR. The environmental impacts are identified through a qualitative process that seeks to answer the question 'could this event constitute a major accident or disaster in terms of the definitions provided?'. Where relevant, specific sensitive receptors around the Proposed Scheme are considered. The Risk Record (**Appendix 20-2: PEIR Risk Record (Volume 3)**) records the outcome of this process.

Assess Risk

20.4.31. The likelihood of the reasonable worst-case environmental effect(s) occurring has been evaluated considering the following:

- the likelihood of the Risk Event occurring considering the measures already embedded into the design and execution of the Proposed Scheme; and
- the likelihood that an environmental receptor is affected by the Risk Event.

20.4.32. Likelihood assessments evaluate whether the effect (for example, loss of life) is a possible outcome of the Risk Event.

20.4.33. This evaluation refers to existing risk assessments as well as consultation with relevant discipline specialists.

20.4.34. The assessment of the risk has been carried out in line with the IEMA Primer[19]. Where likely significant adverse effects are identified, mitigation measures must be in place, commensurate with the likelihood of the event occurring. The assessment considers, in consultation with relevant environmental topics, whether the risk to the environmental receptor is managed to be ALARP with the embedded mitigation measures. If gaps are identified, where the embedded mitigation measures do not represent management of risks to an environmental receptor to be ALARP, then additional measures will be required. The Risk Record presented in **Appendix 20-2: PEIR Risk Record (Volume 3)** records the outcome of the assessment.

Appraise Risk Management Options

20.4.35. Risk management options fall into the following categories:

- Eliminate (or 'avoid') the risk by adopting alternative processes to eradicate the source of the hazard or remove the receptor.
- Reduce the risk by adapting proposed processes such that either the likelihood or the impact of the Risk Event can be decreased.
- Isolate the risk by using physical measures to ensure that should the Risk Event occur, it can be effectively isolated such that there is no pathway.
- Control the risk by ensuring that appropriate measures are in place (for example emergency response) so that should a Risk Event occur, it can be controlled and managed appropriately. The mitigation hierarchy of repair and compensate any significant damage to environmental receptors may then apply following a control measure.
- Exploit the risk if it presents potential benefits or new opportunities.

20.4.36. As safety risks will be required to be adequately addressed within the regulatory framework for the Proposed Scheme, it is not anticipated that significant residual effects, in terms of safety risks, will be identified as an output of the assessment.

SIGNIFICANCE CRITERIA

20.4.37. By definition, a major accident and/or disaster would have a major significant effect on the environment. Accordingly, any risks that could result in a MA&D without suitable mitigation, management or regulatory controls in place will be assessed as significant.

20.5. STUDY AREA

20.5.1. MA&D types both within and outside the Site have been assessed, along with potential internal and external influencing factors. The following factors and associated distances from the Site Boundary were adopted for setting the Study Area:

- Manmade features:
  - Airports and airfields within approximately 13km (the legal distance of the safeguarding zone for licensed airports in the UK);
  - COMAH facilities within approximately 3km (distance to furthest COMAH installation centre point whose CZ overlaps the Proposed Scheme);
  - Major Accident Hazard pipelines (MAHP) within approximately 1km (distance to furthest MAHP whose CZ overlaps the Proposed Scheme);
  - Nuclear installations within approximately 3km (distance to the Land Use Planning Outer Consultation Zone);
  - Bulk fuel storage facilities (including Liquified Natural Gas, Liquified Petroleum Gas) within approximately 500m;
  - Rail infrastructure within approximately 100m; and
  - Transmission lines (gas, electrical, oil/fuels) within the Site.
- Natural features with the potential to create risks within:
  - 3km (chiefly hydrological and geological, for example dam failure and seismic activity respectively); and
  - 1km (chiefly hydrological and geological, for example flood risk and unstable ground conditions respectively).

20.5.2. The internal and external influencing factors, which may have high adverse consequences on the Proposed Scheme, were reviewed for the varying distances identified in Paragraph 20.5.1 above. As presented in the EIA Scoping Report[43], it was identified that the key factors were within a 2km radius around the Proposed Scheme. Therefore, the extent of the Study Area used for the MA&D PEIR assessment is 2km.

20.6. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

20.6.1. The baseline relevant to MA&D comprises:

- features external to the Proposed Scheme that contribute a potential source of hazard to the Proposed Scheme;
- sensitive environmental receptors at risk of significant effect; and
- current (without the Proposed Scheme) MA&D risks in the locality.

20.6.2. There are four COMAH sites within a 5km radius of the Proposed Scheme:

- Crossness Sewage Treatment Works, Thames Water Utilities Limited (Lower Tier) (adjacent to the Site Boundary);
- Dagenham, Stolthaven Dagenham Limited (Chemical installations - distribution, Fuel storage/distribution) (Upper Tier) (approximately 750m from the Site Boundary);
- Rainham, Flogas Britain Limited (Fuel storage/distribution) (Upper Tier) (approximately 815m from the Site Boundary); and
- Riverside Sewage Treatment Works, Thames Water Utilities Limited (Lower Tier) (approximately 1.8km from the Site Boundary).

20.6.3. Baseline information from the following Chapters has also been used to inform the MA&D assessment:

- **Chapter 5: Air Quality (Volume 1);**
- **Chapter 7: Terrestrial Biodiversity (Volume 1);**
- **Chapter 8: Marine Biodiversity (Volume 1);**
- **Chapter 11: Water (Volume 1);**
- **Chapter 12: Climate Resilience (Volume 1);**
- **Chapter 14: Population, Health and Land Use (Volume 1);**
- **Chapter 17: Ground Conditions (Volume 1);**
- **Chapter 18: Landside Transport (Volume 1); and**
- **Chapter 19: Marine Navigation (Volume 1).**

FUTURE BASELINE

20.6.4. The future baseline is not anticipated to differ significantly from the current baseline with regards to the vulnerability of the Proposed Scheme to the risk of major accident(s) and/or disaster(s) with Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken) being operational.

20.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

20.7.1. This section sets out the embedded design, mitigation and enhancement measures in place to address the vulnerability of the Proposed Scheme to the risk of MA&D events.

20.7.2. The Applicant has committed to constructing and managing the Proposed Scheme in accordance with the following non-exclusive list of standards and systems:

- Programme of hazard studies of the Carbon Capture Facility to produce an inherently safe design and to ensure residual risks are managed to be ALARP;
- Environmental, Health & Safety Management systems;
- CDM Health & Safety Plan; (relevant to construction phase only);
- Supplier management environmental, health & safety standards (e.g., Construction Skills Certification Scheme);
- Risk management systems;
- OCoCP for construction phase environmental mitigation (to be submitted as part of the application for development consent); and
- OEPRP for operational phase emergency preparedness and response planning (to be submitted as part of the application for development consent).

20.8. PRELIMINARY ASSESSMENT OF VULNERABILITY TO THE RISK OF MAJOR ACCIDENTS AND DISASTERS

20.8.1. This section details the output of the preliminary assessment of the vulnerability of the Proposed Scheme to the risk of MA&D during both the construction and operation phases, taking into account the embedded design, mitigation and enhancement measures detailed in **Section 20.7**.

20.8.2. The choice between demolition or retention of the Belvedere Power Station Jetty (disused) will not change the outcomes of the preliminary assessment of impacts and effects reported within this technical chapter. It is considered unlikely that the demolition or retention would result in significant changes to the MA&D Risk Event as similar risks will be associated with the Proposed Jetty, although this will be assessed and confirmed in the ES.

POTENTIAL MAJOR ACCIDENT AND DISASTER EVENTS

20.8.3. Based on the information known at this stage of the Proposed Scheme, MA&D Events to which the Proposed Scheme may be vulnerable during construction and operation are summarised below.

Construction Phase

20.8.4. One MA&D Event has been identified to which the Proposed Scheme may be vulnerable during the construction phase as detailed in **Table 20-6** below. All events that have been considered are set out in **Appendix 20-2: PEIR Risk Record (Volume 3)**.

20.8.5. The MA&D Events presented are appropriate for both construction programme options, as set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

Table 20-6: Potential MA&D Events Grouped by High Level Risk Event (Construction Phase)

Risk Record Entry Number	MA&D Category	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event Did Occur
4	Transport accidents	Marine vessel containing construction materials collides with the Proposed Jetty.	Collapse/damage to structures	Damage to the marine vessel/jetty/other vessel with the potential to cause loss of life or permanent injury which requires ongoing disability support.

20.8.6. The ALARP status will be determined in the ES once the mitigation measures have been defined.

Operation Phase

20.8.7. Eight MA&D Events have been identified to which the Proposed Scheme may be vulnerable during the operation phase as detailed in **Table 20-7** below. All events that have been considered are set out in **Appendix 20-2: PEIR Risk Record (Volume 3)**.

Table 20-7: Potential MA&D Events Grouped by High Level Risk Event (Operation Phase)

Risk Record Entry Number	MA&D Category	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event Did Occur
8	Industrial and urban accidents	Unconfined vapour explosion on the Carbon Capture Facility initiating a major event on the adjacent COMAH installation.	Fire and/or explosion or release of harmful gas.	Unconfined vapour explosion onsite leading to structural damage and harm to people onsite and users of PRoW.
10	Industrial and urban accidents	Major fire on the Carbon Capture Facility initiating a major event on the adjacent COMAH installation due to the lack of fire water capacity.	Fire and/or explosion or release of harmful gas.	Fire contained within the Site with drift of airborne combustion products offsite, potentially causing permanent or long-lasting damage to environmental receptor(s) that cannot be restored through minor clean-up and restoration efforts.
11	Industrial and urban accidents	Large scale release of CO_2 resulting from a loss of containment event involving a pipeline and/or storage tank.	Explosion or release of harmful gas.	CO_2 toxicity and fogging hazard affects neighbouring properties and/or those people in the immediate area (including users of public rights of way and open spaces) potentially causing loss of life or permanent injury which requires ongoing disability support.

Risk Record Entry Number	MA&D Category	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event Did Occur
12	Industrial and urban accidents	Large scale release of CO_2 resulting from a loss of containment event involving a pipeline and/or connection to the marine vessel.	Explosion or release of harmful gas.	CO_2 toxicity and fogging hazard affects neighbouring properties and/or those people in the immediate area (including users of public rights of way and open spaces) potentially causing loss of life or permanent injury which requires ongoing disability support.
13	Industrial and urban accidents	Major fire at Riverside 1 and/or 2 facilities initiating a major event at the Carbon Capture Facility.	Fire and/or explosion or release of harmful gas.	Fire contained within the site with drift of airborne combustion products offsite, potentially causing permanent or long-lasting damage to environmental receptor(s) that cannot be restored through minor clean-up and restoration efforts.
14	Transport accidents (waterways)	Large scale release of CO_2 resulting from a loss of containment event involving a marine vessel.	Explosion or release of harmful gas.	CO_2 toxicity and fogging hazard affects neighbouring properties and/or those people in the immediate area, potentially causing loss of life or permanent injury which requires ongoing disability support.
16	Pollution accidents (land)	Loss of containment of hazardous materials/ waste into the soil/ groundwater.	Harm to ecological receptors.	Localised contamination of the soil, potentially causing permanent or long-lasting damage to environmental receptor(s) that cannot be restored through minor clean-up and restoration efforts.

Risk Record Entry Number	MA&D Category	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event Did Occur
17	Pollution accidents (water)	Loss of containment of hazardous materials/ waste into surface water features.	Harm to ecological receptors.	Localised contamination of surface water features, potentially causing permanent or long-lasting damage to environmental receptor(s) that cannot be restored through minor clean-up and restoration efforts.

20.8.8. Based on the assumptions and mitigation measures put forward in other relevant PEIR Chapters, it is considered that the identified potential major accident(s) and/or disaster(s) events above would all be managed to be ALARP, other than for risk record entry numbers 8 and 14, where the ALARP status cannot be determined until appropriate mitigation measures have been defined in the ES.

20.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

20.9.1. Additional design, mitigation and enhancement measures are set out in **Appendix 20-2: PEIR Risk Record (Volume 3)**.

20.10. MONITORING

20.10.1. No monitoring specifically driven by MA&D is considered to be proportionate or to be required.

20.11. NEXT STEPS

20.11.1. Further work to be completed and included in the ES comprises:

- The MA&D assessment will be further developed and refined based on any relevant responses to the Statutory Consultation.
- The assessment within the ES will involve a review of the potential major accident and disaster events presented in this technical chapter based on further information as part of ongoing design development. Further assessment as part of this chapter indicated that the key influencing external factors (such as coastal and fluvial flooding, major accident hazard sites, major accident hazard pipelines) that may have high adverse consequences on the Proposed Scheme were within 100m of the Proposed Scheme. Therefore, the extent of the Study Area to be used within the MA&D assessment presented within the ES will be reduced to 100m.
- Assessment of the major event types which could not be addressed in the PEIR due to insufficient information being available at this stage of the Proposed Scheme.

20.12. LIMITATIONS AND ASSUMPTIONS

20.12.1. This section outlines the limitations, uncertainties, and assumptions made in assessing the vulnerability of the Proposed Scheme to a MA&D reported in this chapter.

- The design of the Proposed Scheme and its implementation is guided by other industry standards and codes, many of which are mandatory. These require infrastructure and systems to be designed so that risks to people and the environment are either eliminated or reduced to levels that are ALARP.
- Environmental effects associated with unplanned events that do not meet the definition of a major accident and/or disaster e.g., minor leaks and spills that may be contained within the construction sites are addressed in other relevant technical chapters.

20.13. REFERENCES

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DECARBONISATION

CHAPTER 21: CUMULATIVE EFFECTS

Cory Decarbonisation Project

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TABLE

21. CUMULATIVE EFFECTS

21.1. INTRODUCTION

21.1.1. This chapter reports the work undertaken to date in relation to the Combined and Cumulative Effects Assessment (CEA). The equivalent chapter in the ES will assess the potential for significant cumulative environmental effects as a result of the Proposed Scheme.

21.1.2. In line with Schedule 4, paragraph 5(e) of the Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017 ('the EIA Regulations')[1] the ES will consider *"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".*

21.1.3. In accordance with the EIA Regulations[1], the Planning Inspectorate's Advice Note 17[2], and other best practice guidance, the following types of combined and cumulative effects will be considered within the ES:

- **Intra-project effects** – the interaction and combination of different residual environmental effects of the Proposed Scheme affecting the same receptor. For example, visual and noise effects during construction affecting nearby PRoW.
- **Inter-project effects** – the residual environmental effects of the Proposed Scheme combining and interacting with the residual environmental effects of other, committed development(s), affecting the same receptor. For example, traffic effects upon users of the local road network because of the Proposed Scheme and a nearby industrial development.

21.1.4. The cumulative impact assessment will not consider other developments that are already constructed and operating, as such existing developments are already accounted for in the baseline conditions established for the technical assessments within **Chapters 5: Air Quality** to **Chapter 20: Major Accidents and Disasters (Volume 1)**.

21.1.5. This chapter describes the following:

- relevant, legislation, policy, and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- draft Long List of Other Developments (**Appendix 21-1: Long List of Other Developments (Volume 3)**); and
- next steps.

21.2. POLICY, LEGISLATION, AND GUIDANCE

21.2.1. The policy, legislation and guidance relevant to the cumulative effects assessment for the Proposed Scheme is set out in **Table 21-1** below:

Table 21-1: Cumulative Effects Summary of key Policy, Legislation and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy (EN-1) 2011[3]	Sets out the Government's policy for delivery of major energy infrastructure and is currently the primary basis for decision making of applications within the Planning Act 2008 regime. The NPS EN-1 requirements for cumulative effects state that (Paragraph 4.2.5): *"When considering cumulative effects, the ES should provide information on how the effects of the applicant's proposal would combine and interact with the effects of other development (including projects for which consent has been sought or granted, as well as those already in existence). The IPC may also have other evidence before it, for example from appraisals of sustainability of relevant NPSs or development plans, on such effects and potential interactions. Any such information may assist the IPC in reaching decisions on proposals and on mitigation measures that may be required".*
Draft Overarching NPS for Energy (EN-1) 2023[4]	This Draft Overarching National Policy Statement for Energy (EN-1) is part of a suite of draft NPSs issued by the Secretary of State of DESNZ. It sets out the government's policy for delivery of major energy infrastructure and will likely replace the 2011 NPSs by the time the application for the Proposed Scheme is submitted. Paragraph 4.3.5 states: *"The impacts of more than one development may affect people simultaneously, so the applicant should consider the cumulative impact on health in the ES where appropriate."* Paragraph 4.8.21 states: *"[…] development consent applications for power CCS projects should include details of how the captured CO2 is intended to be transported and stored, how*

Policy, Legislation or Guidance	Description
	cumulative impacts will be assessed and whether any necessary consents, permits and licences have been obtained."
National Planning Policy Framework (NPPF) 2023[5]	The NPPF sets out the Government's planning policies for England and how these should be applied, with the following paragraphs relating to cumulative effects: Paragraph 185: *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development".*
The London Plan 2021[6]	The Spatial Development Strategy for Greater London setting out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Many of these policies include specific positions and considerations for the assessment of cumulative effects.
The Bexley Local Plan 2023[7]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development across the Borough. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy, and the Connected Communities Strategy. It does not contain any specific policies related to cumulative effects, but inherently highlights the importance of considering the potential cumulative impacts of new developments throughout the Local Plan.
London Environment Strategy 2018[8]	The London Environment Strategy seeks to ensure that London will become a "*zero carbon city by 2050*" by setting out policies and proposals in seven policy areas to address environmental challenges, including the transition to a low carbon circular economy. The Mayor wants to ensure "*London's businesses and workers are supported to be able to compete effectively in, and benefit from, this growing global market*".

Policy, Legislation or Guidance	Description
South East Inshore Marine Plan 2021[9]	The South East Inshore Marine Plan area stretches from Felixstowe in Suffolk to west of Dover in Kent and incorporates the River Thames. The South East Inshore Marine Plan will help to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan area. The Plan helps to address potential cumulative and in-combination effects of impacts from the many and increasing pressures. The relevant policy to the cumulative effects assessment is: • SE-CE-1.
Legislation	
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017[1]	The EIA Regulations cover the process of EIA in the context of Nationally Significant Infrastructure Projects. They apply the amended EU Directive 2014/52/EU. Schedule 4, paragraph 5 and 5(e) (see paragraph 1.1.3 above) is of relevance to cumulative effects.
Guidance	
Demystifying Cumulative Effects, Impact Assessment Outlook Journal 2020[10]	The EIA process requires the consideration of cumulative effects to be undertaken. However, guidance on this area of practice is often lacking, and a variety of methodologies are adopted by different practitioners. Volume 7 of the Impact Assessment Outlook Journal brings together a selection of articles, thought and opinion pieces on CEA in EIA.
Planning Inspectorate Advice Note 17: Cumulative Effects Assessment[2]	This Advice Note identifies the nature of projects (referred to as 'Other Developments') that should be considered in a CEA. It advises that a pragmatic approach should be used, in respect of what is feasible and reasonable, where there is a lack of information to identify impacts and assess effects. Planning Inspectorate Note 17[2] specifies that statutory definitions of EIA screening thresholds can be of assistance when considering whether the scale and nature of developments identified in Zone of Influence (ZOI) are likely to interact with the proposed project development and to result in a cumulative effect.

21.3. SCOPING OPINION AND CONSULTATION

21.3.1. An EIA Scoping Opinion[11] was received by the Applicant from the Planning Inspectorate on 26 May 2023. The responses from the Planning Inspectorate and statutory consultees in relation to cumulative effects and how these requirements should be addressed by the Applicant are set out in **Table 21-2** below.

Table 21-2: Summary of the EIA Scoping Opinion in Relation to Cumulative Effects

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
The Planning Inspectorate			
3.17.1	Inter-project cumulative effects –developments under at least an equivalent size of 30 residential units.	*"The Inspectorate considers that small scale developments are unlikely to give rise to significant cumulative effects over and above the Proposed Development in isolation and agrees that this matter can be scoped out".*	No response required.
3.17.2	Inter-project cumulative effects – • Projects on the Inspectorate's Programme of Projects where a Scoping Report, PEIR or an equivalent has been submitted (Tier 2 projects as set out in the Inspectorate's Advice Note 17: 'Cumulative effects assessment relevant to NSIP projects'); and • Projects on the Inspectorate's Programme of Projects where a Scoping Report	*"It appears from paragraph 20.3.14 of the Scoping Report that projects on the Inspectorate's Programme of Projects where a Scoping Report, PEIR or an equivalent has (or has not) been submitted, would not be included in the list of other developments. The Inspectorate does not agree that any relevant other development at these stages can be scoped out of the cumulative effects assessment.* *Relevant other developments on the Inspectorate's Programme of Projects where a Scoping Report, PEIR or an equivalent has (or has not) been submitted, which falls within the Proposed Development's ZoI, should be identified. As set out in Advice Note 17, an assessment should be provided for all Tier 1 and Tier 2 other development, where possible. For other development falling into Tier 3, the Applicant should aim to undertake an assessment where possible, although this may be qualitative and at a very high level. The assessment should be carried out with reasonable effort and should be clearly*	Clarity has been added to the list of criteria for inclusion within the assessment and **Table 21-4** to make it clear that the Planning Inspectorate's Programme of Projects[12] (including projects at Scoping or PEIR stage) are included at the time of writing.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
	or PEIR has not been submitted (Tier 3 projects as set out in the Inspectorate's Advice Note 17).	*documented in the ES for example using the format presented in Matrix 2 of Advice Note 17."*	
3.17.3	List of other developments	*"The list of specific other developments for inclusion in the cumulative effects assessment has not been determined at this stage. The Scoping Report confirms that the relevant local planning authorities would be consulted regarding other developments for inclusion.* *The Inspectorate recommends that other relevant bodies (including Natural England, the Environment Agency and for plans/ projects in the marine area, the MMO) should also be consulted to ensure that the list of other development identified for inclusion in the cumulative effects assessment is comprehensive and accurate."*	Natural England, the Environment Agency and the MMO will all be provided with the opportunity to comment on **Appendix 21-1: Long List of Other Developments (Volume 3)** as part of the Statutory Consultation (on this PEIR).
Environment Agency			
10.8.12		*"We disagree with the proposed approach to assessing the impact of the in-channel works on sediment movement in the River Thames. Detailed quantitative sediment transport modelling should be carried out. That should include assessing the cumulative effects with the existing jetty and also with other nearby in-channel structures. The former sediment study that was undertaken for Middleton Jetty should be provided and compared to the changes that have taken place since that jetty*	The impacts associated with the Proposed Scheme on sediment transport processes has been assessed within **Chapter 11: Water Environment and Flood Risk (Volume 1)** and this assessment will be reviewed

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
		was constructed. That comparison should be used to learn from the former method of assessment and to determine the sensitivity to change of the dynamic sediment transport regime in this section of the River Thames. That should then inform the sediment transport modelling for the proposed in-channel works."	and presented within the ES. This assessment will be supported by the results of numerical modelling as appropriate, as described within **Chapter 11: Water Environment and Flood Risk (Volume 1).** The cumulative effects assessment presented in the ES will reflect any updates to **Chapter 11: Water Environment and Flood Risk (Volume 1)** which itself will consider impacts of other structures in its assessment of sediment transport impacts.
London Borough of Bexley			
Page 9 of 9		*"The Council is generally satisfied at the details submitted in this chapter and that the applicant has adequately addressed this issue at this stage. It is understood that there may be some cumulative effects as a result of this development however, it would be down to the applicant to demonstrate that any cumulative effect is acceptable".*	No response required.

21.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

21.4.1. There is no widely accepted methodology or best practice for the assessment of cumulative effects, although there are several guidance documents available, including Advice Note 17[2] which will (and has) inform the approach taken to the Intra-project effects and Inter-project effects assessments. The approach that will be adopted is based on professional experience, the types of receptors being assessed and the nature of the Proposed Scheme.

21.4.2. The assessment will be qualitative and based on the available information. Partially quantitative assessments may be undertaken for some elements where practicable, such as for traffic related effects. Where information is not available, assumptions that adopt a worst-case approach will be made based on professional judgement. All assumptions will be clearly stated alongside any uncertainty as part of the Intra-project effects and Inter-project effects assessments. These assessments will be presented within the ES.

21.4.3. The assessment presented in **Chapter 13: Greenhouse Gases (Volume 1**) is excluded from the assessment of cumulative effects. The impacts associated with GHG emissions, in terms of their contribution to climate change, are global and cumulative in nature, with every tonne contributing to impacts on natural and human systems. As such it is the cumulative effect of all GHG-emitting human activities that cause climate change, and therefore the assessment of GHG due to the Proposed Scheme implicitly assesses the cumulative effect of GHG emissions. This is explained further in **Chapter 13: Greenhouse Gases (Volume 1**), including a discussion of the transport and storage of the carbon captured by the Proposed Scheme and the assessment has been compared against the UK and London carbon budgets to provide context for the estimated emissions.

INTRA-PROJECT EFFECTS

21.4.4. The assessment of Intra-project effects will be based on the information and Study Areas within the technical chapters (**Chapters 5: Air Quality (Volume 1)** to **Chapter 20: Major Accidents and Disasters (Volume 1)**). This assessment considers any residual effects that are reported as non-negligible (or equivalent) within the technical chapters. Minor effects, while not significant, are considered in the assessment on the basis that multiple minor effects may interact to result in a significant effect. Negligible residual effects reported in the technical chapters are considered unlikely to accumulate to the extent that a significant Intra-project effect would occur.

21.4.5. The assessment methodology for Intra-project effects will involve the following key stages.

Stage 1 – Screening of Sensitive Receptors

21.4.6. A screening of sensitive receptors (as identified in each technical chapter) will be undertaken to determine whether any has the potential to be exposed to more than one type of residual effect (within an individual technical topic assessment and/or across multiple technical topic assessments) during either the construction or operation phases of the Proposed Scheme. These sensitive receptors are termed 'Common Receptors' and will be taken forward to Stage 2 of the assessment.

Stage 2 – Determine Common Receptor's Residual Effects

21.4.7. Of the Common Receptors identified in Stage 1, those that have two or more non-negligible residual effects will be identified and taken forward to Stage 3 of the assessment.

Stage 3 – Assessment of Intra-Project Effects

21.4.8. An assessment of the overall significance of the Intra-project effects on Common Receptors identified at Stage 2 will be undertaken. The assessment will be based on information provided within the technical topic assessments, as well as professional judgement. The assessment will consider the nature of the residual effects acting on the identified Common Receptors and determine whether or not these residual effects, acting in-combination, would significantly magnify the overall residual effects on specific receptors. Receptors will be assessed at spatial scale consistent with that of the technical chapters.

INTER-PROJECT EFFECTS

21.4.9. The assessment methodology for Inter-project effects will involve the identification of incremental changes to baseline conditions likely to be caused by other relevant projects together with the Proposed Scheme. These will involve the following key stages.

Stage 1 – Identification Developments for Consideration: The Long List

21.4.10. Stage 1 of the approach outlined in Advice Note 17[2] requires the identification of a Zone of Influence (ZOI) for each technical chapter (derived from the Study Areas in **Chapter 5: Air Quality (Volume 1)** to **Chapter 20: Major Accidents and Disasters (Volume 1)**) considered within the ES for the Proposed Scheme, with other, reasonably foreseeable developments identified within those ZOI. These projects are termed 'Other Developments'. For the purpose of Inter-project effects, the term 'ZOI' is to be used in place of 'Study Area'.

21.4.11. For the purpose of this report and **Appendix 21-1: Long List of Other Developments (Volume 3)** the Study Areas defined in technical chapters (**Chapters 5: Air Quality (Volume 1)** to **Chapter 20: Major Accidents and Disasters (Volume 1)**) have been reviewed to determine the maximum ZOI likely to be scoped into the Inter-project effects assessment. This is 10km, taken from **Chapter 7: Terrestrial Biodiversity (Volume 1)** Study Area for 'Statutory Designated Sites – SSSI' and **Chapter 5: Air Quality (Volume 1)** Study Area for Human receptors within 10km of the Site Boundary that are the most likely to experience a change in NO_2, particulate matter and amine concentrations as a result of emissions from the Proposed Scheme.

21.4.12. This 10km ZOI has been used to establish the draft 'long list' of 'Other Developments' (**Appendix 21-1: Long List of Other Developments (Volume 3)**. The 15km Study Area for statutory designated sites described in **Chapter 7: Terrestrial Biodiversity (Volume 1)** is excluded from the ZOI for determination of **Appendix 21-1: Long List of Other Developments (Volume 3)** as the assessment of inter-project effects on these receptors will be considered in the HRA given effects will be limited to ecology for that distance.

21.4.13. 'Other Developments' have been identified through an initial search, within the identified ZOI, of the: planning registers of the local planning authorities and Planning Inspectorate's planning register. This has led to the creation of a 'long-list' of 'Other Developments' for consideration (corresponding with Stage 1 in Advice Note 17[2]) in **Appendix 21-1: Long List of Other Developments (Volume 3)**.

21.4.14. The starting point for the creation of this list was Table 2 of Advice Note 17 which provides criteria to indicate the level of certainty that can be applied to each of the 'Other Developments' being considered. The criteria are presented, descending from Tier 1 (most certain) to Tier 3 (least certain) and reflect a diminishing degree of certainty that can be assigned to each 'Other Development'.

Table 21-3: Assigning Certainty to 'Other Developments' Advice Note 17[2]

Tier	Certainty
Tier 1	• Under construction. • Permitted application(s), whether under the Planning Act (PA 2008)[13] or other regimes, but not yet implemented. • Submitted application(s) where a full ES or other equivalent has been submitted.
Tier 2	• Projects on the Planning Inspectorate's programme of projects[12] where a Scoping Report, PEIR or equivalent has been submitted. • Developments on a LPA's planning register where an EIA Scoping Report or equivalent.
Tier 3	• Projects on the Planning Inspectorate's programme of projects[12] where a Scoping Report or PEIR has not yet been submitted. • Developments on a LPA's planning register with little or no environmental assessment information. • Identified in other plans and programmes (where advised by the relevant LPA following publication of this PEIR) which set the framework for future development consents/approvals, recognising that there will be limited information available on the 'Other Developments'.

21.4.15. For the selection of 'Other Developments' the following criteria has been considered ahead of inclusion in the long list. The Planning Inspectorate's programme of Projects[12] and relevant eight London Boroughs' Planning Registers[1] within the ZOI have been reviewed for developments meeting the below criteria:

- the development is of at least an equivalent size to 30 residential units;
- the development is under construction but is not yet completed;
- the development has been permitted within the last five years but is yet to be constructed/implemented;
- submitted requests for an EIA Scoping Opinion;
- submitted application(s) for a development that are awaiting determination; and
- submitted applications(s) for a development that have been refused and are subject to appeal procedures.

[1] As well as the Planning Registers, the respective London Borough Local Plans will be examined to determine the status of planning policies and allocations for developments. References to these policies and allocations will be included alongside Other Developments where relevant.

21.4.16. The relevant eight London Boroughs' Planning Registers are:

- London Borough of Barking and Dagenham;
- London Borough of Bexley;
- Dartford Borough Council;
- Royal Borough of Greenwich;
- London Borough of Havering;
- London Borough of Newham;
- London Borough of Redbridge; and
- Thurrock Council.

21.4.17. The relevant planning authorities are provided with the opportunity to comment on **Appendix 21-1: Long List of Other Developments (Volume 3)** as part of the Statutory Consultation (on this PEIR). A draft long list has been produced (**Appendix 21-1: Long List of Other Developments (Volume 3)**), and this list will be reviewed and updated at the ES stage ahead of progressing to Stage 2, to ensure that the search of 'Other Developments' is as up to date as practicable.

Stage 2 – Identify a Short List of 'Other Developments'

21.4.18. Following the data collection (Stage 1) the long list will be refined post Statutory Consultation to a short-list by reviewing each of the 'Other Developments' identified against the following criteria. The short-list will be presented as part of the CEA in the ES:

- Is there a concurrent construction or operation phase between the 'Other Developments' and the Proposed Scheme?
- Is there potential that the 'Other Developments' share some of the same sensitive receptors with the Proposed Scheme?
- Those 'Other Developments' that have no, or insufficient, environmental assessment information will, typically, not be considered as it will not be possible to accurately identify shared sensitive receptors or Inter-project effects.

Stage 3 – Identification of Information for the Other Developments

21.4.19. Information on the short listed 'Other Developments' will be gathered from third-party sources within the public domain.

21.4.20. The information captured should include, but not necessarily be limited to:

- design and site boundary information;
- programme of construction and operation; and
- technical information that sets out baseline data and effects arising from the 'Other Developments' on Common Receptors.

Stage 4 – Assessment of Inter-Project Effects

21.4.21. The assessment of Inter-project effects will consider the deviation from the baseline conditions for Common Receptors because of changes brought about due to the Proposed Scheme in combination with one or more 'Other Developments' in the short-list. This stage corresponds with Stage 4 of Advice Note 17[2].

21.4.22. The assessment of the Inter-project effects will be based upon the residual effects (including non-significant effects) identified in the technical topic assessments of the ES, as well as available environmental information for the 'Other Developments'.

21.4.23. The assessment of Inter-project effects will consider the following:

- combined magnitude of change;
- sensitivity/value/importance of the receptor to change; and/or
- duration and reversibility of effect.

21.4.24. Through a combination of the qualitative evaluation presented in the ES and the environmental information available for 'Other Developments', conclusions will be drawn as to the likelihood for significant Inter-project effects, i.e. those over and above, or different to, those identified for the Proposed Scheme on its own.

21.4.25. If significant residual Inter-project effects are identified that need to be remedied by the Proposed Scheme (in situations where it would not be appropriate or possible for the Other Development to do so) necessary mitigation measures will be proposed in the ES.

SIGNIFICANCE CRITERIA

Intra-Project Effects

21.4.26. The significance classifications for intra-project effects are detailed in **Table 21-4** below.

Table 21-4: Intra-Project Effects Significance Criteria

Significance Category	Definition of Effect
Major	Adverse or Beneficial effects that are a significant magnification of potentially wide-ranging effects on receptors/resources that are already predicted to occur.
Moderate	Adverse or Beneficial effects that are a significant magnification of effects on receptors/resources that are already predicted to occur.
Minor	Adverse or Beneficial effects that would only lead to a localised magnification of effects on a receptor/resource.
Negligible	No effects or effects that are beneath the level of perception, within normal bounds of variation or within the margin of forecasting error.

Inter-Project Effects

21.4.27. The assessment of inter-project effects will consider the potential for significant residual effects, for which appropriate, additional mitigation measures will be proposed. The significance of the effect is formulated as a function of a sensitive receptor's or a resource's environmental value/sensitivity and the magnitude of the impact of the Proposed Scheme. This aligns with Advice Note 17[2] which states: *"The significance criteria used to assess likely cumulative effects should consider the capacity of environmental resources and receptors to accommodate changes that are likely to occur. The terminology used to determine significance should be explicit and ensure a clear understanding of the outcome of the CEA".*

21.4.28. The significance classifications for inter-project effects are detailed in **Table 21-5** below.

Table 21-5: Inter-Project Effects Significance Criteria

Significance Category	Definition of Effect
Major	Adverse of Beneficial effects recognised to be very important considerations as significant magnification of effects on receptors/resources is likely to occur.
Moderate	Adverse or Beneficial effects that are unlikely to become issues, but where future work may be needed to improve on current performance as significant magnification of effects on receptor/resource is likely to occur.
Minor	Adverse of Beneficial effects that are locally significant and would be unlikely to lead to a significant magnification of effects on a receptor/resource.
Negligible	No effects or effects that are beneath the level of perception, within normal bounds of variation or within the margin of forecasting error.

21.5. STUDY AREA

INTRA-PROJECT EFFECTS

21.5.1. The Study Areas used for the assessment of intra-project effects are those detailed in the relevant technical chapters (**Chapter 5: Air Quality (Volume 1)** to **Chapter 20: Major Accidents and Disasters (Volume 1)**).

INTER-PROJECT EFFECTS

21.5.2. The ZOI for inter-project effect is 10km, as described above in **Section 21.4**.

21.6. BASELINE CONDITIONS

21.6.1. The baseline conditions for this chapter are as described in the relevant technical chapters (**Chapter 5: Air Quality (Volume 1)** to **Chapter 20: Major Accidents and Disasters (Volume 1)**).

21.7. NEXT STEPS

21.7.1. The assessment of intra-project effects will be carried out during the EIA process and will be presented in the ES.

21.7.2. For inter-project effects Stages 2, 3 and 4 of the assessment, as described in **Section 21.4** above, will be carried out during the EIA process and will be presented in the ES. This will include reviewing and updating the long and developing the short-list to ensure all 'Other Developments' are correct at the time of writing.

21.7.3. **Appendix 21-1: Long List of Other Developments (Volume 3)**) is presented as part of the PEIR. The following Statutory Consultees are to be consulted (as a minimum) at Statutory Consultation to consider this list:

- Planning Inspectorate;
- Marine Management Organisation;
- Natural England;
- Environment Agency;
- London Borough of Barking and Dagenham;
- London Borough of Bexley;
- Dartford Borough Council;
- Royal Borough of Greenwich;
- London Borough of Havering;
- London Borough of Newham;
- London Borough of Redbridge; and
- Thurrock Council.

21.8. REFERENCES

[1] UK Government. (2017). 'The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017', UK Statutory Instruments. No. 572. Available at: https://www.legislation.gov.uk/uksi/2017/572/contents/made

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[3] Department of Energy & Climate Change. (2011). 'Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/media/5a79522de5274a2acd18bd53/1938-overarching-nps-for-energy-en1.pdf

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[11] The Planning Inspectorate. (2023). 'Scoping Opinion: Proposed Cory Decarbonisation Project'. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010128/EN010128-000026-EN010128%20-%20Scoping%20Opinion.pdf

[12] National Infrastructure Planning. (2023). 'Planning Inspectorate's Programme of Projects'. Available at: https://infrastructure.planninginspectorate.gov.uk/projects/

[13] UK Government. (2008). 'Planning Act 2008'. Available at: https://www.legislation.gov.uk/ukpga/2008/29/contents

DECARBONISATION

CHAPTER 22: SUMMARY OF EFFECTS

Cory Decarbonisation Project

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TABLE

22. SUMMARY OF EFFECTS

22.1. INTRODUCTION

22.1.1. The technical topic specific impact assessments are presented in **Chapter 5: Air Quality (Volume 1)** to **Chapter 20: Major Accidents and Disasters (Volume 1)** and have considered the potential environmental impacts and likely significant effects of the Proposed Scheme. This chapter provides a summary of the likely effects reported in the topic chapters and this is provided **Table 22-1** below.

22.1.2. The preliminary assessment of significant effects will be reviewed and updated assessments will be reported in the ES.

22.2. SIGNIFICANCE OF EFFECTS

22.2.1. As set out in **Section 4.10** of **Chapter 4: EIA Methodology (Volume 1)**, effects, whether adverse or beneficial, assessed as having “moderate” or “major” significance are deemed to be significant. Effects determined to be “minor” or “negligible” are deemed to be not significant. Any deviation from this approach is detailed in the methodology for each assessment within **Chapter 5: Air Quality (Volume 1)** to **Chapter 20: Major Accidents and Disasters (Volume 1)**.

22.2.2. The assessment of cumulative effects has not yet been carried out and cumulative effects have therefore not been included in **Table 22-1**. The assessment of cumulative effects will be presented within the ES.

22.2.3. **Table 22-1** includes the following information:

- a description of the effect;
- the sensitive receptor;
- a summary of the significance of likely effects prior to the implementation of additional mitigation;
- a summary of the additional mitigation measures to be implemented to minimise the significance of the effects (further information is provided in each technical chapter); and
- the residual significance of these effects assuming all proposed additional mitigation is implemented.

22.2.4. Due to the nature of the assessment, the summary of likely effects assessed within **Chapter 20: Major Accidents and Disasters (Volume 1)** is presented separately in **Table 22-2**.

Table 22-1: Summary of Likely Environment Effects

Description of Effect		Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Chapter 5: Air Quality					
Construction Phase					
Dust, PM_{10} and $PM_{2.5}$	Dust soiling effects during demolition, earthworks, construction and trackout	Nearby places of work	**Minor to moderate Adverse (not significant)**	Mitigation set out in **Section 5.9**.	**Negligible (not significant)**
	Human health effects during demolition	Nearby places of work	**Minor Adverse (not significant)**	Mitigation set out in **Section 5.9**.	**Negligible (not significant)**
	Ecological effects during demolition	Crossness LNR	**Minor Adverse (not significant)**	Mitigation set out in **Section 5.9**.	**Negligible (not significant)**
Emissions of NO_2, PM_{10} and $PM_{2.5}$ from operational NRMM	Human health effects from NRMM	Nearby places of work	**Negligible (not significant)**	Mitigation set out in **Section 5.9**.	**Negligible (not significant)**
Road traffic emissions of NO_2, PM_{10} and $PM_{2.5}$		This assessment will be presented in Chapter 5: Air Quality (Volume 1) of the ES.			

Description of Effect		Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Marine vessel emissions of NO_2, PM_{10} and $PM_{2.5}$		This assessment will be presented in Chapter 5: Air Quality (Volume 1) of the ES.			
Operation Phase					
Changes to Emissions of Pollutants at Riverside Campus as a result of the Carbon Capture Facility	Impacts on human health (including within local authorities and air quality focus areas)	Any location of relevant exposure	**Negligible** for all pollutants except nitrosamines, nitramines and aldehydes **(not significant)**	Further sensitivity testing is required to set emissions limits for these pollutants which result in acceptable levels of risk.	**Slight Adverse (not significant)**
	Impacts on ecological receptors	Detailed assessment deferred to ES for Ingrebourne Marshes and Inner Thames Marshes SSSIs, and Crossness and Rainham Marshes LNRs. Not significant for other receptor sites.			
	Impacts on ecological receptors	All designated sites except those above	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Emissions of NO_2, PM_{10} and $PM_{2.5}$ From New Backup Power Generators (Ancillary Infrastructure)		This assessment will be presented in Chapter 5: Air Quality (Volume 1) of the ES.			
Marine vessel emissions of NO_2, PM_{10} and $PM_{2.5}$		This assessment will be presented in Chapter 5: Air Quality (Volume 1) of the ES.			

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Air Quality Neutral Assessment and Air Quality Positive Statement	A formal statement setting out the evidence base for the design measures incorporated in the Proposed Scheme to satisfy the requirements for Air Quality Positive will be provided as a technical appendix to the ES.			
Chapter 6: Noise and Vibration				
Construction Phase				
Construction Noise (landside receptors)	C1 - Clydesdale Way	**Minor (not significant)**	N/A	**Minor (not significant)**
	C2 - North Road	**Minor (not significant)**	N/A	**Minor (not significant)**
	C3 - Little Brights Road	**Minor (not significant)**	N/A	**Minor (not significant)**
	C4 - Travellers' site located off Jenningtree Way	**Minor (not significant)**	N/A	**Minor (not significant)**
	C5 - Travelodge London Belvedere hotel	**Minor (not significant)**	N/A	**Minor (not significant)**
Construction Road Traffic Noise	N/A	**Negligible (not significant)**	None required.	**Negligible (not significant)**
Operation Phase				
Operational Noise (landside receptors)	C1 - Clydesdale Way	**Minor Adverse (not significant)**	Selecting quietest ASHP fans and locating plant as	**Minor Adverse (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	C5 - Travelodge London Belvedere hotel	**Moderate Adverse (significant)**	far as practicable away from sensitive receptors.	**Minor Adverse (not significant)**
Chapter 7: Terrestrial Biodiversity				
Construction Phase				
Habitat loss and fragmentation	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, Coastal and floodplain grazing marsh HPI, Intertidal mudflats HPI, Wintering birds.	**Moderate Adverse (significant)**	Habitat creation and enhancement.	**Negligible (not significant)**
Habitat loss and fragmentation	Modified grassland, reedbeds, other neutral grassland, mixed scrub, open mosaic habitat, standing water.	**Minor Adverse (not significant)**	Habitat creation and enhancement.	**Negligible (not significant)**
Habitat loss and fragmentation	Bats, breeding birds, notable plants and invasive species, reptiles, terrestrial invertebrates, water	To be determined following completion of surveys and presented within the ES.	Habitat creation and enhancement. Proposals for habitat creation and enhancement are under development and subject	To be determined following completion of surveys and

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	vole, aquatic macroinvertebrates, freshwater fish and macrophytes.		to change depending on their feasibility.	presented within the ES.
Noise and vibration	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, wintering birds.	**Moderate Adverse (significant)**	Timing of certain works to avoid sensitive wintering period.	**Minor Adverse (not significant)**
Noise and vibration	Bats, breeding birds, reptiles, terrestrial invertebrates, water vole, freshwater fish.	To be determined following completion of surveys and presented within the ES.	Timing of certain works to avoid sensitive periods (e.g., vegetation clearance in bird breeding season and fish migration and spawning periods).	To be determined following completion of surveys and presented within the ES.
Dust	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, deciduous woodland HPI, coastal and	**Negligible (not significant)**	None.	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	floodplain grazing marsh HPI, intertidal mudflats HPI, coastal saltmarsh HPI, river habitat, modified grassland, reedbeds, other neutral grassland, mixed scrub, open mosaic habitat, standing water, bats, breeding birds, notable plants and invasive species, reptiles, terrestrial invertebrates, water vole, wintering birds, freshwater fish, aquatic macroinvertebrates, macrophytes.			
Surface water run-off	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, coastal and floodplain	**Moderate Adverse (significant)**	Pollution control measures.	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	grazing marsh HPI, intertidal mudflats HPI, coastal saltmarsh HPI, river habitat, wintering birds.			
Surface water run-off	Reedbeds, standing water.	**Minor Adverse (significant)**	Pollution control measures.	**Negligible (not significant)**
Surface water run-off	Bats, breeding birds, notable plants and invasive species, reptiles, terrestrial invertebrates, water vole, aquatic macroinvertebrates, freshwater fish and macrophytes.	To be determined following completion of surveys and presented within the ES.	Pollution control measures.	To be determined following completion of surveys and presented within the ES.
Lighting	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, wintering birds.	**Moderate Adverse (significant)**	Control of construction phase lighting to focus it on construction areas.	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Lighting	Bats, breeding birds, reptiles, terrestrial invertebrates, water vole, aquatic macroinvertebrates, macrophytes and freshwater fish.	To be determined following completion of surveys and presented within the ES.	Control of construction phase lighting to focus it on construction areas	To be determined following completion of surveys and presented within the ES.
Changes in air quality	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, deciduous woodland HPI, coastal and floodplain grazing marsh HPI, intertidal mudflats HPI, coastal saltmarsh HPI, river habitat.	**Moderate Adverse (significant)**	Control of emissions, habitat enhancement.	**Minor Adverse (not significant)**
Changes in air quality	Modified grassland, reedbeds, other neutral grassland, mixed scrub, open mosaic habitat, standing water	**Minor Adverse (not significant)**	Control of emissions, habitat enhancement.	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Changes in air quality	Aquatic macroinvertebrates, freshwater fish.	**Moderate Adverse (significant)**	Control of emissions, habitat enhancement.	**Minor Adverse (not significant)**
Changes in air quality	Macrophytes	**Negligible (not significant)**	Control of emissions, habitat enhancement.	**Negligible (not significant)**
Changes in air quality	Notable plants and invasive species.	To be determined following completion of surveys and presented within the ES.	None.	To be determined following completion of surveys and presented within the ES.
Shading	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, coastal and floodplain grazing marsh HPI, modified grassland, reedbeds, other neutral grassland, mixed scrub, open mosaic habitat, standing water, bats, breeding birds, notable plants and invasive	To be determined following completion of modelling work and surveys and presented within the ES.	Potential effects would be mitigated through changes to construction equipment and methods, but requirements to be determined.	To be determined following completion of modelling work and surveys and presented within the ES.

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	species, reptiles, terrestrial invertebrates, water vole, wintering birds, aquatic macroinvertebrates, freshwater fish and macrophytes.			
Operation Phase				
Noise and vibration	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, wintering birds.	**Moderate Adverse (significant)**	Timing of certain operations to avoid sensitive periods. Measures to control operational noise are to be included within the OEMP.	**Minor Adverse (not significant)**
Noise and vibration	Bats, breeding birds, reptiles, terrestrial invertebrates, water vole, freshwater fish.	To be determined following completion of surveys and presented within the ES.	Timing of certain operations to avoid sensitive periods.	To be determined following completion of surveys and presented within the ES.

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Maintenance activities	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, wintering birds.	**Moderate Adverse (significant)**	Timing of maintenance activities to avoid sensitive periods, amendment of working practices to reduce disturbance.	**Minor Adverse (not significant)**
Maintenance activities	Bats, breeding birds, water vole.	To be determined following completion of surveys and presented within the ES.	Timing of maintenance activities to avoid sensitive periods.	To be determined following completion of surveys.
Surface water run-off	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, coastal and floodplain grazing marsh HPI, intertidal mudflats HPI, coastal saltmarsh HPI, river habitat, wintering birds.	**Moderate Adverse (significant)**	Pollution control measures.	**Negligible (not significant)**
Surface water run-off	Reedbeds, standing water	**Minor Adverse (not significant)**	Pollution control measures.	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Surface water run-off	Bats, breeding birds, notable plants and invasive species, reptiles, terrestrial invertebrates, water vole, aquatic macroinvertebrates, freshwater fish and macrophytes.	To be determined following completion of surveys and presented within the ES.	Pollution control measures.	To be determined following completion of surveys and presented within the ES.
Lighting	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, wintering birds.	**Moderate Adverse (significant)**	Control of construction phase lighting to focus it on construction areas.	**Negligible (not significant)**
Lighting	Bats, breeding birds, reptiles, terrestrial invertebrates, water vole, aquatic macroinvertebrates, freshwater fish and macrophytes.	To be determined following completion of surveys and presented within the ES.	Control of construction phase lighting to focus it on construction areas.	To be determined following completion of surveys and presented within the ES.
Changes in air quality	Inner Thames Marshes SSSI and Ingrebourne	**Potentially up to Moderate Adverse (significant)**	Design changes and operational controls.	**Potentially up to Moderate**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	Marshes SSSI, Crossness LNR, Rainham Marshes LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, 18 further SINCs outside of the Site, deciduous woodland HPI, coastal and floodplain grazing marsh HPI, intertidal mudflats HPI, coastal saltmarsh HPI, river habitat.			**Adverse (significant)**
Changes in air quality	Modified grassland, reedbeds, other neutral grassland, mixed scrub, open mosaic habitat, standing water, macrophytes.	**Negligible (not significant)**	Design changes and operational controls.	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Changes in air quality	Notable plants and invasive species.	To be determined following completion of surveys and presented within the ES.	Design changes and operational controls.	To be determined following completion of surveys and presented within the ES.
Changes in air quality	Freshwater fish, aquatic Macroinvertebrates	**Potentially up to Moderate Adverse** (**Significant**)	Habitat management and improvement.	**Potentially up to Minor Adverse (Not significant)**
Shading	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, Coastal and floodplain grazing marsh HPI, modified grassland, reedbeds, other neutral grassland, mixed scrub, open mosaic habitat, standing water, bats, breeding birds, notable plants and invasive species, reptiles,	To be determined following completion of modelling work and surveys and presented within the ES.	Potential effects would be mitigated through changes to design of the Proposed Scheme, but requirements to be determined.	To be determined following completion of modelling work and surveys and presented within the ES.

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	terrestrial invertebrates, water vole, wintering birds, aquatic macroinvertebrates, freshwater fish and macrophytes.			
Chapter 8: Marine Biodiversity				
Construction Phase				
Loss or disturbance of habitat[a]	Medway Estuary MCZ	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.9**. Including the potential creation of additional habitat through tidal terracing on the existing river wall and the addition of ecological enhancements e.g., the inclusion of rope on pier legs to mimic algae and marine plants. These enhancement measures	**Minor Adverse (not significant)**

[a] This includes the potential removal or retention of the Belvedere Power Station Jetty (disused).

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
			could be applied to the Proposed Jetty structure. To be explored in further detail in the ES.	
	River Thames and Tidal Tributaries SINC	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.9**. Including the potential creation of additional habitat through the potential tidal terracing on the existing river wall and the addition of ecological enhancements e.g., the inclusion of rope on pier legs to mimic algae and marine plants. These enhancement measures could be applied to the Proposed Jetty structure. To be explored in further detail in the ES.	**Minor Adverse (not significant)**
	Intertidal mudflat, saltmarsh and	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.9**. Including the potential creation of	**Minor Adverse (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	associated communities		additional habitat through tidal terracing on the existing river wall and the addition of ecological enhancements e.g., the inclusion of rope on pier legs to mimic algae and marine plants. These enhancement measures could be applied to the Proposed Jetty structure. To be explored in further detail in the ES.	
	Subtidal habitats and associated communities	**Negligible (not significant)**	None required.	**Negligible (not significant)**
	Marine plants and Macroalgae	**Negligible (not significant)**	None required.	**Negligible (not significant)**
	Fish of National importance	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.9**. Including the potential creation of additional habitat through tidal terracing on the existing river wall and the	**Minor Adverse (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
			addition of ecological enhancements e.g., the inclusion of rope on pier legs to mimic algae and marine plants. These enhancement measures could be applied to the Proposed Jetty structure. To be explored in further detail in the ES.	
	Marine mammals	**Negligible (not significant)**	None required.	**Negligible (not significant)**
Changes in water quality and release of contaminants	Medway Estuary MCZ, River Thames and Tidal tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and macroalgae, fish, marine mammals	This will be assessed in detail the ES chapter once full sediment contaminant analysis and sediment transport modelling has been completed.	To be determined within the ES chapter.	To be determined in the ES chapter.
Noise and Vibration[a]	Medway Estuary MCZ, Fish, marine mammals	This will be assessed in detail in the ES chapter once noise modelling results are available.	To be determined within the ES chapter.	To be determined in the ES chapter.

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Lighting[a]	Medway Estuary MCZ, River Thames and Tidal tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and macroalgae, fish, marine mammals	**Negligible (not significant)**	None required.	**Negligible (not significant)**
Vessel Strike[a]	Marine Mammals	**Negligible (not significant)**	None required.	**Negligible (not significant)**
Change in suspended sediment levels and subsequent sediment deposition	Medway Estuary MCZ, River Thames and Tidal tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and macroalgae, fish, marine mammals	This will be assessed in detail the ES chapter once full sediment contaminant analysis and sediment transport modelling has been completed.	To be determined within the ES chapter.	To be determined in the ES chapter.
Increased wave wash	Medway Estuary MCZ, River Thames and Tidal tributaries SINC, Intertidal habitats, Subtidal habitats,	**Negligible (not significant)**	None required.	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	Marine plants and macroalgae, fish			
Spread of INNS[a]	Medway Estuary MCZ	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.10**. Including monitoring of INNS to aid implementation of an INNS Management Plan.	**Minor Adverse (not significant)**
	River Thames and Tidal Tributaries SINC	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.10**. Including monitoring of INNS to aid implementation of an INNS Management Plan.	**Minor Adverse (not significant)**
	Intertidal mudflat, saltmarsh and associated communities	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.10**. Including monitoring of INNS to aid implementation of an INNS Management Plan.	**Minor Adverse (not significant)**
	Subtidal habitats and associated benthic communities	**Negligible (not significant)**	None required.	**Negligible (not significant)**
	Marine plants and macroalgae	**Negligible (not significant)**	None required.	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	Fish	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.10**. Including monitoring of INNS to aid implementation of an INNS Management Plan.	**Minor Adverse (not significant)**
Operation Phase				
Loss or disturbance of habitat	Medway Estuary MCZ	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.9**. Including the potential creation of additional habitat through tidal terracing on the existing river wall and the addition of ecological enhancements e.g., the inclusion of rope on pier legs to mimic algae and marine plants. These enhancement measures could be applied to the Proposed Jetty structure. To be explored in further detail in the ES.	**Minor Adverse (not significant)**
	River Thames and Tidal Tributaries SINC	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.9**. Including	**Minor Adverse (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
			the potential creation of additional habitat through tidal terracing on the existing river wall and the addition of ecological enhancements e.g., the inclusion of rope on pier legs to mimic algae and marine plants. These enhancement measures could be applied to the Proposed Jetty structure. To be explored in further detail in the ES.	
	Intertidal mudflat and saltmarsh and associated communities	**Negligible (not significant)**	None required.	**Negligible (not significant)**
	Subtidal habitats and associated benthic communities	**Negligible (not significant)**	None required.	**Negligible (not significant)**
	Marine plants and macroalgae	**Negligible (not significant)**	None required.	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	Fish	**Moderate Adverse (significant)**	Additional mitigation listed in **Section 8.9**. Including the potential creation of additional habitat through tidal terracing on the existing river wall and the addition of ecological enhancements e.g., the inclusion of rope on pier legs to mimic algae and marine plants. These enhancement measures could be applied to the Proposed Jetty structure. To be explored in further detail in the ES.	**Minor Adverse (not significant)**
	Marine mammals	**Negligible (not significant)**	None required.	**Negligible (not significant)**
Water quality and release of contaminants	Medway Estuary MCZ, River Thames and Tidal tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and	This will be assessed in detail the ES chapter once full sediment contaminant analysis and sediment transport modelling has been completed.	To be determined within the ES chapter.	To be determined in the ES chapter.

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	macroalgae, fish, marine mammals			
Noise and vibration	Medway Estuary MCZ, River Thames and Tidal tributaries SINC, Fish, marine mammals	**Negligible (not significant)**	None required.	**Negligible (not significant)**
Lighting	Medway Estuary MCZ, River Thames and Tidal tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and macroalgae, fish, marine mammals	**Negligible (not significant)**	None required.	**Negligible (not significant)**
Vessel strikes	Marine mammals	**Negligible (not significant)**	None required.	**Negligible (not significant)**
Changes in suspended sediment concentrations and subsequent sediment deposition	Medway Estuary MCZ, River Thames and Tidal tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and	This will be assessed in detail the ES chapter once full sediment contaminant analysis and sediment transport modelling has been completed.	To be determined within the ES chapter.	To be determined in the ES chapter.

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	macroalgae, fish, marine mammals			
Increased wave wash	Medway Estuary MCZ, River Thames and Tidal tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and macroalgae, fish, marine mammals	**Negligible (not significant)**	None required.	**Negligible (not significant)**
Spread of INNS	Medway Estuary MCZ, River Thames and Tidal tributaries SINC, Intertidal habitats, Subtidal habitats, Marine plants and macroalgae, fish, marine mammals	This will be assessed in detail the ES chapter once full sediment contaminant analysis and sediment transport modelling has been completed.	To be determined within the ES chapter.	To be determined in the ES chapter.
Chapter 9: Historic Environment				
Construction Phase				
Potential physical effects on unknown buried heritage assets within the Site (archaeological	Palaeoenvironmental Remains	**Moderate Adverse (significant)**	Production and publication of a Geoarchaeological	**Minor Adverse (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
remains), including potential submerged remains within the Thames foreshore (marine)			Deposit Model, secured through the application for development consent as part of the Archaeological Mitigation Strategy.	
	Potential Prehistoric and Roman Remains	**Minor Adverse (not significant)**	Geoarchaeological Deposit Model.	**Minor Adverse (not significant)**
	Unrecorded Post-medieval and Modern Remains	**Minor Adverse (not significant)**	No additional mitigation is proposed.	**Minor Adverse (not significant)**
	Post-medieval and Modern Marine Obstructions	**Moderate Adverse (significant)**	Further survey of the proposed dredged channel followed by archaeological mitigation. i.e., targeted excavation/recording, watching brief or preservation *in situ.*	**Minor Adverse (not significant)**
Demolition of non-designated above ground heritage assets within the Site	Belvedere Power Station Jetty (disused), if removed as part of the Proposed Scheme	**Moderate Adverse (significant)**	Should the Belvedere Power Station Jetty (disused) be demolished, an Historic England Level 2 Historic Building Recording will be	**Minor Adverse (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
			required, undertaken prior to demolition to offset the predicted effects. This will ensure that an accurate record of the Jetty is archived with the GLHER and ADS for future research and understanding of heritage value.	
Operation Phase				
Potential indirect effects on unknown buried heritage assets within the Site (archaeological remains), including potential submerged remains within the Thames foreshore (marine)	Palaeoenvironmental Remains	**Moderate Adverse (significant).**	Production and publication of an updated Geoarchaeological Deposit Model, secured by the DCO as part of the archaeological mitigation strategy.	**Minor Adverse (not significant)**
	Potential Submerged Remains	**Moderate Adverse (significant)**	Further survey of the proposed dredged channel followed by archaeological mitigation. i.e. targeted excavation/recording,	**Minor Adverse (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
			watching brief or preservation *in situ.*	
Potential permanent effects on designated above ground heritage assets located beyond the Site Boundary and within the Study Area through changes to setting	Crossness Pumping Station (A2-A4 and A6)	**Minor Adverse (not significant)**	No additional measures are proposed during the operation phase for above ground heritage assets.	**Minor Adverse (not significant)**
	No. 4 Jetty and Approach	**Minor Adverse (not significant)**		**Minor Adverse (not significant)**
Chapter 10: Townscape and Visual				
Construction Phase				
Potential Effects on Townscape Character				
Change of character and vegetation cover within the Site	Site Character	**Large Adverse (significant)**	No further mitigation measures.	**Large Adverse (significant)**
Change in local townscape character (within 2km of the Site Boundary)	Townscape Character	**Slight-moderate Adverse (not significant)**	Stockpiles utilised to screen views of construction activities and light pollution where practicable.	**Slight-moderate adverse (not significant)**
Potential Effects on Visual Amenity (including locally designated views)				
Change in character and visual amenity from Open Spaces	Open Spaces	**Large Adverse (significant)**	Stockpiles utilised to screen views of construction activities and	**Large Adverse (significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
			light pollution where practicable.	
Change in visual amenity from the local PRoW network	PRoW	**Moderate Adverse (significant)**	Stockpiles utilised to screen views of construction activities and light pollution where practicable.	**Moderate Adverse (significant)**
Change in visual amenity from the local road network within 2km of the Site Boundary	Road Network	**Slight Adverse (not significant)**	Stockpiles utilised to screen views of construction activities and light pollution where practicable.	**Slight Adverse (not significant)**
Change in visual amenity from residential areas with views towards the Proposed and within the 2km Study Area	Residential	**Slight-moderate Adverse (not significant)**	Stockpiles utilised to screen views of construction activities and light pollution where practicable.	**Slight-moderate Adverse (not significant)**
Operational Phase				
<u>Potential Effects on Townscape Character</u>				
Change in Site character and vegetation cover	Site Character	**Moderate Adverse (significant) (Year 1)**	No additional mitigation beyond ongoing iterative design development and associated mitigation	**Moderate Adverse (significant) (Year 1)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
		Moderate Adverse (significant) (Year 15)	measures planned to be identified in the OLEMP and DAD.	**Moderate Adverse (significant) (Year 15)**
Change in local townscape character (within 2km of the Site Boundary)	Townscape Character	**Slight-moderate Adverse (not significant) (Year 1)** **Slight-moderate Adverse (not significant) (Year 15)**	No additional mitigation beyond ongoing iterative design development and associated mitigation measures planned to be identified in the OLEMP and DAD.	**Slight-moderate Adverse (not significant) (Year 1)** **Slight-moderate Adverse (not significant) (Year 15)**
Potential Effects on Visual Amenity (including locally designated views)				
Change in character and visual amenity from Open Spaces	Open Spaces	**Moderate-large Adverse (significant) (Year 1)** **Moderate-large Adverse (significant) (Year 15)**	No additional mitigation beyond ongoing iterative design development and associated mitigation measures planned to be identified in the OLEMP and DAD.	**Moderate-large Adverse (significant) (Year 1)** **Moderate-large Adverse (significant) (Year 15)**
Change in visual amenity from the local PRoW network	PRoW	**Moderate Adverse (significant) (Year 1)**	No additional mitigation beyond ongoing iterative	**Moderate Adverse**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
		Slight-moderate Adverse (not significant) (Year 15)	design development and associated mitigation measures planned to be identified in the OLEMP and DAD.	**(significant) (Year 1)** **Slight-moderate Adverse (not significant) (Year 15)**
Change in visual amenity from the local road network within 2km of the Site Boundary	Road Network	**Slight Adverse (not significant) (Year 1)** **Neutral (not significant) (Year 15)**	No additional mitigation beyond ongoing iterative design development and associated mitigation measures planned to be identified in the OLEMP and DAD.	**Slight Adverse (not significant) (Year 1)** **Neutral (not significant) (Year 15)**
Change in visual amenity from residential areas with views towards the Proposed and within the 2km Study Area	Residential	**Slight-moderate Adverse (not significant) (Year 1)** **Slight-moderate Adverse (not significant) (Year 15)**	No additional mitigation beyond ongoing iterative design development and associated mitigation measures planned to be identified in the OLEMP and DAD.	**Slight-moderate Adverse (not significant) (Year 1)** **Slight-moderate Adverse (not significant) (Year 15)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Chapter 11: Water Environment and Flood Risk				
Construction Phase				
Quality of surface water features (including the biological, physico-chemical and hydromorphological quality aspects)	River Thames Marsh Dykes Ponds Crossness LNR	**Moderate Adverse (significant)**	Additional mitigation is outlined in **Section 11.9**, further measures will be identified for inclusion in the OCoCP as the design develops.	**Slight Adverse (not significant)**
Quantity of surface water features / flows	River Thames Marsh Dykes	**Moderate Adverse (significant)**	Additional mitigation is outlined in **Section 11.9**, further measures will be identified for inclusion in the OCoCP as the design develops.	**Slight Adverse (not significant)**
Groundwater quality and quantity (level and flow) of the Secondary A bedrock aquifers (Lambeth Group including Thanet Sand Formation) and superficial deposit aquifers designated Secondary (undifferentiated and Secondary A aquifers	Thanet Sand and Lambeth Group (bedrock) Secondary A aquifer. Superficial deposit aquifers designated Secondary Undifferentiated aquifers (Alluvium and	**Moderate Adverse (significant)**	Additional mitigation is outlined in **Section 11.9**, further measures will be identified for inclusion in the OCoCP as the design develops.	**Slight Adverse (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
(Alluvium, Head Deposits and Taplow Gravel Member	Head Deposits) and Secondary A aquifer (Taplow Gravel Member)			
Biological, physico-chemical and hydromorphological quality elements of the WFD designated water bodies (Thames Middle Water Body and Greenwich Tertiaries and Chalk Groundwater Body)	River Thames	**Moderate Adverse (significant)**	Additional mitigation is outlined in **Section 11.9**, further measures will be identified for inclusion in the OCoCP as the design develops.	**Slight Adverse** (**not significant**)
Changes to the sediment transport regime	River Thames	This assessment will be presented in Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES.		
Flood Risk: • **Breach of the River Thames flood defences;** • **Flooding from Marsh Dykes;** • **Loss of watercourse channel;** • **Flood risk associated with the Proposed Jetty;** • **Surface water flooding,** • **Groundwater Flooding;** • **Artificial sources; and**	River Thames Marsh Dykes Floodplain (associated with a breach of the River Thames flood defences) Floodplain (associated with Marsh Dykes) People (e.g. site visitors and staff and users of	**Moderate Adverse (significant)**	Additional mitigation is outlined in **Section 11.9**, further measures will be identified for inclusion in the OCoCP as the design develops.	**Slight Adverse (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
• **Flood risk to people.**	adjacent third party sites / land)			
Operation Phase				
Quality of surface water features (including the biological, physico-chemical and hydromorphological quality aspects)	River Thames Marsh Dykes Ponds Crossness LNR	**Moderate Adverse (significant)**	Additional mitigation measures will be identified as the design progresses in relation to the Outline Drainage strategy for the Proposed Scheme.	**Slight Adverse (not significant)**
Quantity of surface water features / flows	River Thames Marsh Dykes	**Moderate Adverse (significant)**	Additional mitigation measures will be identified as the design progresses in relation to the quantity of surface water features.	**Slight Adverse (not significant)**
Impacts to groundwater flows and levels on the Thanet Sand and Lambeth Group (bedrock) Secondary A aquifers and superficial deposit aquifers designated Secondary Undifferentiated and Secondary A aquifers (Alluvium, Head	Thanet Sand and Lambeth Group (bedrock) Secondary A aquifer. Superficial deposit aquifers designated Secondary	**Moderate Adverse (significant)**	Additional mitigation measures will be identified as the design progresses in relation to groundwater quality, flows and levels.	**Slight Adverse (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Deposits and Taplow Gravel Member, respectively)	Undifferentiated aquifers (Alluvium and Head Deposits) and Secondary A aquifer (Taplow Gravel Member)			
Groundwater quality of the superficial and bedrock aquifers	Thanet Sand and Lambeth Group (bedrock) Secondary A aquifer. Superficial deposit aquifers designated Secondary Undifferentiated aquifers (Alluvium and Head Deposits) and Secondary A aquifer (Taplow Gravel Member)	**Moderate Adverse (significant)**	Additional mitigation measures will be identified as the design progresses in relation to groundwater quality.	**Slight Adverse (not significant)**
Biological, physico-chemical and hydromorphological quality elements of the WFD designated water body (Thames Middle Water Body and	River Thames	**Moderate Adverse (significant)**	Additional mitigation measures will be identified as the design progresses in relation to	**Slight Adverse (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Greenwich Tertiaries and Chalk Groundwater Body)			WFD mitigation measures.	
Changes to the sediment transport regime	River Thames	This assessment will be presented in Chapter 11: Water Environment and Flood Risk (Volume 1) of the ES.		
Flood Risk: • **Breach of the River Thames flood defences;** • **Flooding from Marsh Dykes;** • **Loss of watercourse channel;** • **Flood risk associated with the Proposed Jetty;** • **Surface water flooding,** • **Groundwater;** • **Artificial sources; and** • **Flood risk to people.**	River Thames Marsh Dykes Floodplain (associated with a breach of the River Thames flood defences) Floodplain (associated with Marsh Dykes) People (e.g. site visitors and staff and users of adjacent third party sites / land)	**Moderate Adverse (significant)**	Additional mitigation measures will be identified as the design progresses in relation to flood risk, these will be detailed in the FRA.	**Slight Adverse (not significant)**
Chapter 12: Climate Resilience				
The assessment of residual effects will be presented in the ES, following the complete assessment of embedded mitigation and significance. It is anticipated that with the additional design, mitigation and enhancement measures in place that all effects will be considered **Not Significant.**				

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Chapter 13: Greenhouse Gases				
Construction Phase				
GHG Emissions	Global Atmosphere	**Moderate Adverse (significant)**	Construction emissions could be minimised through design optimisation in line with PAS 2080:2023 principles to reflect the carbon reduction hierarchy as well as other measures detailed in **Section 13.8**.	**Minor Adverse (not significant)**
Operation Phase				
GHG Emissions	Global Atmosphere	**Beneficial (significant)**	N/A	**Beneficial (significant)**
Chapter 14: Population, Health and Land Use				
Construction Phase				
Effects on Terrestrial Businesses	Munster Joinery	**Major Adverse (significant)**	Engagement with local business. The Applicant is currently seeking to identify a suitable site for the relocation of Munster	**Major Adverse (significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
			Joinery, however, this has not been identified at this stage of the Proposed Scheme.	
	Iron Mountain	**Moderate Adverse (significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Minor Adverse (not significant)**
	Asda Distribution Centre	**Moderate Adverse effect (significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Minor Adverse (not significant)**
	Travelodge London Belvedere	**Minor Adverse (not significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Negligible (not significant)**
	The Morgan	**Minor Adverse (not significant)**	Engagement with local business.	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
			Signage to advertise that businesses are open and operating as normal.	
	Snap Fitness	**Minor Adverse (not significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Negligible (not significant)**
	Lidl Belvedere Regional Distribution Centre	**Moderate Adverse effect (significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Minor Adverse (not significant)**
	Tap'in 3PL Ltd	**Minor Adverse (not significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Negligible (not significant)**
	Howdens Joinery	**Minor Adverse (not significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	Ctr Group	**Minor Adverse (not significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Negligible (not significant)**
	HS Carlsteel Engineering Ltd	**Minor Adverse (not significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Negligible (not significant)**
	Freshasia Foods Ltd.	**Minor Adverse (not significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Negligible (not significant)**
	Intersped Logistics (UK) Limited	**Minor Adverse (not significant)**	Engagement with local business. Signage to advertise that businesses are open and operating as normal.	**Negligible (not significant)**
	Ford Dagenham	**Negligible (not significant)**	Engagement with local business.	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Effects on Businesses that rely upon access to the River Thames			Development of a Passage Plan.	
	Thames Water – Crossness Water Treatment Works	**Negligible (not significant)**	Engagement with local business. Development of a Passage Plan.	**Negligible (not significant)**
Effects on Walkers and Cyclists	England Coast Path	**Moderate Adverse (significant)**	Engagement with users through clear signage on planned disruption.	**Minor Adverse (not significant)**
	NCN1	**Moderate Adverse (significant)**	Engagement with users through clear signage on planned disruption.	**Minor Adverse (not significant)**
	FP1	**Minor Adverse (not significant)**	Engagement with users through clear signage on planned disruption.	**Negligible (not significant)**
	FP2	**Moderate Adverse (significant)**	Engagement with users and clear signage of diversions.	**Minor Adverse (not significant)**
	FP3	**Minor Adverse (not significant)**	Engagement with users through clear signage on planned disruption.	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	FP4	**Moderate Adverse effect (significant)**	Engagement with users and clear signage of diversions.	**Minor Adverse effect (not significant)**
	FP242	**Minor Adverse effect (not significant)**	Engagement with users through clear signage on planned disruption.	**Negligible (not significant)**
Effects on Terrestrial Recreation	Crossness LNR (areas permanently lost)	**Moderate Adverse (significant)**	Engagement with users.	**Moderate Adverse (significant)**
	Crossness LNR (areas outside of the Site Boundary and areas within the Site that won't be permanently lost)	**Minor Adverse (not significant)**	Engagement with users.	**Minor Adverse (not significant)**
	Erith Marshes SINC (areas permanently lost)	**Moderate Adverse (significant)**	Engagement with users.	**Moderate Adverse (significant)**
	Erith Marshes SINC (areas outside of the Site Boundary and areas within the Site	**Minor Adverse (not significant)**	Engagement with users.	**Minor Adverse (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	that won't be permanently lost)			
	MOL (areas permanently lost)	**Moderate Adverse (significant)**	Engagement with users.	**Moderate Adverse (significant)**
	MOL (areas outside of the Site Boundary and areas within the Site that won't be permanently lost)	**Minor Adverse (not significant)**	Engagement with users.	**Minor Adverse (not significant)**
	Southeast London Green Chain (areas permanently lost)	**Moderate Adverse (not significant)**	Engagement with users.	**Moderate Adverse (significant)**
	Southeast London Green Chain (areas outside of the Site Boundary and areas within the Site that won't be permanently lost)	**Minor Adverse (not significant)**	Engagement with users.	**Minor Adverse (not significant)**
	Grazing land used by gypsies and travellers	To be determined following completion of modelling work	Potential effects would be mitigated through engagement with users,	To be determined following

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
		and surveys and presented within the ES.	but requirements to be determined.	completion of modelling work and surveys and presented within the ES.
Effects on Recreational Users of the Thames	Recreational users	**Minor Adverse effect (not significant)**	Engagement with users.	**Minor Adverse (not significant)**
	Erith Yacht Club	**Minor Adverse (not significant)**	Engagement with users.	**Negligible (not significant)**
	Erith Rowing Club	**Minor Adverse (not significant)**	Engagement with users.	**Negligible (not significant)**
	Thamesmead fishing mark	**Minor Adverse (not significant)**	Engagement with users.	**Negligible (not significant)**
	Erith Pier fishing mark	**Minor Adverse (not significant)**	Engagement with users.	**Negligible (not significant)**
Effects on Human Health	Local Population	**Minor Adverse (not significant)**	Ongoing engagement with the local community.	**Negligible (not significant)**
Effects on Mental health and wellbeing	Local Population	**Minor Adverse (not significant)**	Ongoing engagement with the local community.	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Operation Phase				
Effects on Businesses that rely upon access to the River Thames	Thames Water – Crossness Water Treatment Works	**Negligible (not significant)**	Engagement with local business. Development of a Passage Plan.	**Negligible (not significant)**
Effects on Walkers and Cyclists	England Coast Path	**Negligible (not significant)**	Engagement with local business. Development of a Passage Plan.	**Negligible (not significant)**
	NCN1	**Negligible (not significant)**	Engagement with users with new information boards detailing the Proposed Scheme and other points of interest.	**Negligible (not significant)**
	FP1	**Negligible (not significant)**	Engagement with users with new information boards detailing the Proposed Scheme and other points of interest.	**Negligible (not significant)**
	FP2	**Negligible (not significant)**	Engagement with users with new information boards detailing the	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
			Proposed Scheme and other points of interest.	
	FP3	**Negligible (not significant)**	Engagement with users with new information boards detailing the Proposed Scheme and other points of interest.	**Negligible (not significant)**
	FP4	**Negligible (not significant)**	Engagement with users with new information boards detailing the Proposed Scheme and other points of interest.	**Negligible (not significant)**
	FP242	**Negligible (not significant)**	Engagement with users with new information boards detailing the Proposed Scheme and other points of interest.	**Negligible (not significant)**
Effects on Terrestrial Recreation	Crossness LNR	**Minor Adverse (not significant)**	Engagement with users.	**Minor Adverse effect (not significant)**
	MOL	**Minor Adverse (not significant)**	Engagement with users.	**Minor Adverse effect (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	Southeast London Green Chain	**Minor Adverse (not significant)**	Engagement with users.	**Minor Adverse effect (not significant)**
Effects on Recreational Users of the Thames	Recreational users	**Negligible (not significant)**	Engagement with users.	**Negligible (not significant)**
	Erith Rowing Club	**Negligible (not significant)**	Engagement with users.	**Negligible (not significant)**
	Erith Yacht Club	**Negligible (not significant)**	Engagement with users.	**Negligible (not significant)**
	Thamesmead fishing mark	**Minor Adverse (not significant)**	Engagement with users.	**Negligible (not significant)**
	Erith Pier fishing mark	**Minor Adverse (not significant)**	Engagement with users.	**Negligible (not significant)**
Effects on Human Health	Local Population	**Minor Adverse effect (not significant)**	Ongoing engagement with the local community through project information boards surrounding the site and updates on operational activities and planned maintenance via the Applicant's website.	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Effects on Mental health and wellbeing	Local Population	**Minor Adverse effect (not significant)**	Ongoing engagement with the local community through project information boards surrounding the site and updates on operational activities and planned maintenance via the Applicant's website.	**Negligible (not significant)**
Chapter 15: Socio-economics				
Construction Phase				
Employment generation	Economic receptors	**Minor Beneficial (not significant)**	N/A	**Minor Beneficial (not significant)**
GVA Generation	Economic receptors	**Minor Beneficial (not significant)**	N/A	**Minor Beneficial (not significant)**
Operation Phase				
Employment Generation	Economic receptors	**Negligible (not significant)**	N/A	**Negligible (not significant)**
GVA Generation	Economic receptors	**Negligible (not significant)**	N/A	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Chapter 16: Materials and Waste				
Construction Phase				
Consumption of material resources	Material resources	**Slight Adverse (not significant)**	No mitigation required (see **Section 16.9** for recommended measures)	**Slight Adverse (not significant)**
Disposal and recovery of waste	Landfill void capacity	**Slight Adverse (not significant)**	No mitigation required (see **Section 16.9** for recommended measures)	**Slight Adverse (not significant)**
Operation Phase				
Consumption of material resources (amine-based solvents)	Material resources	To be determined through assessment in the ES.		
Disposal and recovery of waste	Landfill void capacity	To be determined through assessment in the ES.		
Chapter 17: Ground Conditions				
Construction Phase				
Site users and staff – in relation to potential exposure to contamination within the underlying soils / groundwater	Site users and staff (excluding construction staff)	**Slight Beneficial (not significant)**	None required.	**Slight Beneficial (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Third party neighbours – in relation to potential exposure to contamination within the underlying soils / groundwater	Third party neighbours	**Slight Beneficial (not significant)**	None required.	**Slight Beneficial (not significant)**
Construction staff – in relation to potential exposure to contamination within the underlying soils / groundwater and reuse of dredged arisings	Construction Staff	**Neutral (not significant)**	None required.	**Neutral (not significant)**
Controlled waters – in relation to potential contamination within the underlying soils / groundwater	Groundwater	**Slight Beneficial (not significant)**	None required.	**Slight Beneficial (not significant)**
	Surface Waters	**Neutral (not significant)**	None required.	**Neutral (not significant)**
Below ground services and building structures – in relation to potential contamination within the underlying soils / groundwater	Below ground services and building materials.	**Neutral (not significant)**	None required.	**Neutral (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Chapter 18: Landside Transport				
Construction Phase				
Pedestrian and Cyclist Severance	PRoW (non-motorised users)	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Pedestrian and Cyclist Delay	PRoW (non-motorised user)	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Pedestrian and Cyclist Amenity	PRoW (non-motorised user)	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Fear and Intimidation	PRoW (non-motorised user)	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Public Transport Network	Public Transport Users	**Minor Adverse (not significant)**	N/A	**Minor Adverse (not significant)**
Driver Delay	Highway Links / Junctions	The assessment will be identified and presented as part of the ES and TA.		
Accidents and Safety	Highway Links / Junctions	The assessment will be identified and presented as part of the ES and TA.		
Operation Phase				
Pedestrian and Cyclist Severance	PRoW (non-motorised user)	**Negligible (not significant)**	N/A	**Negligible (not significant)**

Description of Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Pedestrian and Cyclist Delay	PRoW (non-motorised user)	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Pedestrian and Cyclist Amenity	PRoW (non-motorised user)	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Fear and Intimidation	PRoW (non-motorised user)	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Public Transport Network	Public Transport Users	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Driver Delay	Highway Links/ Junctions (motorised users)	The assessment will be identified and presented as part of the ES and TA.		
Accidents and Safety	Highway Links/ Junctions (motorised users)	The assessment will be identified and presented as part of the ES and TA.		
Hazardous Loads	Highway Links/ Junctions (motorised users)	**Negligible (not significant)**	N/A	**Negligible (not significant)**
Chapter 19: Marine Navigation				
Residual effects will be identified as part of the pNRA and presented as part of the ES.				

Table 22-2: Summary of Effects for the Assessment of Major Accidents and Disasters

Risk Record Entry Number	MA&D Category	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event Did Occur
Construction Phase				
4	Transport accidents	Marine vessel containing construction materials collides with the Proposed Jetty.	Collapse / damage to structures	Damage to the marine vessel/jetty/other vessel with the potential to cause loss of life or permanent injury which requires ongoing disability support.
Operation Phase				
8	Industrial and urban accidents	Unconfined vapour explosion on the Carbon Capture Facility initiating a major event on the adjacent COMAH installation.	Fire and/or explosion or release of harmful gas.	Unconfined vapour explosion onsite leading to structural damage and harm to people onsite and users of PRoW.
10	Industrial and urban accidents	Major fire on the Carbon Capture Facility initiating a major event on the adjacent COMAH installation due to the lack of fire water capacity.	Fire and/or explosion or release of harmful gas.	Fire contained within the Site with drift of airborne combustion products offsite, potentially causing permanent or long-lasting damage to environmental receptor(s) that cannot be restored through minor

Risk Record Entry Number	MA&D Category	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event Did Occur
				clean-up and restoration efforts.
11	Industrial and urban accidents	Large scale release of CO_2 resulting from a loss of containment event involving a pipeline and/or storage tank.	Explosion or release of harmful gas.	CO_2 toxicity and fogging hazard affects neighbouring properties and/or those people in the immediate area (including users of public rights of way and open spaces) potentially causing loss of life or permanent injury which requires ongoing disability support.
12	Industrial and urban accidents	Large scale release of CO_2 resulting from a loss of containment event involving a pipeline and/or connection to the marine vessel.	Explosion or release of harmful gas.	CO_2 toxicity and fogging hazard affects neighbouring properties and/or those people in the immediate area (including users of public rights of way and open spaces) potentially causing loss of life or permanent injury which requires ongoing disability support.

Risk Record Entry Number	MA&D Category	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event Did Occur
13	Industrial and urban accidents	Major fire at Riverside 1 and/or 2 facilities initiating a major event at the Carbon Capture Facility.	Fire and/or explosion or release of harmful gas.	Fire contained within the site with drift of airborne combustion products offsite, potentially causing permanent or long-lasting damage to environmental receptor(s) that cannot be restored through minor clean-up and restoration efforts.
14	Transport accidents (waterways)	Large scale release of CO_2 resulting from a loss of containment event involving a marine vessel.	Explosion or release of harmful gas.	CO_2 toxicity and fogging hazard affects neighbouring properties and/or those people in the immediate area, potentially causing loss of life or permanent injury which requires ongoing disability support.
16	Pollution accidents (land)	Loss of containment of hazardous materials/ waste into the soil/ groundwater.	Harm to ecological receptors.	Localised contamination of the soil, potentially causing permanent or long-lasting damage to environmental receptor(s)

Risk Record Entry Number	MA&D Category	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event Did Occur
				that cannot be restored through minor clean-up and restoration efforts.
17	Pollution accidents (water)	Loss of containment of hazardous materials/ waste into surface water features.	Harm to ecological receptors.	Localised contamination of surface water features, potentially causing permanent or long-lasting damage to environmental receptor(s) that cannot be restored through minor clean-up and restoration efforts.

DECARBONISATION

10 Dominion Street
Floor 5
Moorgate, London
EC2M 2EF
Contact Tel: 020 7417 5200
Email: enquiries@corygroup.co.uk
corygroup.co.uk