ENVIRONMENTAL IMPACT ASSESSMENT SCOPING REPORT

Cory Environmental Holdings Limited

Cory Decarbonisation Project

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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 meriting consideration in planning decisions, because of its **heritage** interest. **Heritage assets** include **designated heritage assets** and **non-designated heritage assets**.
Additional Mitigation	Actions that will require further activity to achieve the anticipated outcome. These may be imposed as part of the **DCO**, or through inclusion in the **Environmental Statement**.
Ancient Woodland	An area that has been wooded continuously since at least 1600 AD. Ancient Woodland is divided into ancient semi-natural woodland and plantations on Ancient Woodland sites. Both types are classed as ancient woods.
Applicant	Cory Environmental Holdings Limited
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.
Baseline	A reference level of existing **environmental conditions** against which a development is measured and controlled.
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

Term	Definition
	structural and functional relationships within and between these different levels.
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 site.
Carbon Capture	The capture of carbon dioxide that would otherwise be emitted into the atmosphere from industrial sources.
Carbon Capture and Storage Project	Infrastructure to remove and store carbon dioxide from the flue gas emitted by **Riverside 1** and **Riverside 2**.
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 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 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**.
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

Term	Definition
	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 **Planning Act 2008** (as amended) (PA2008) to authorise a **Nationally Significant Infrastructure Project** (NSIP).
Direct Employment	An increase in employment arising from further 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.
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 in the **Environmental Statement**.
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**.

Term	Definition
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).
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 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 Scoping Opinion adopted by the **Secretary of State** (where relevant).

Term	Definition
Flood Map for Planning	Defines **Flood Zones** based on annual probability of flooding from fluvial and tidal sources to inform development planning and flood risk assessment. 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 1000 (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	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**.
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 emit reflected solar radiation which result in the warming of the

Term	Definition
	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 GHGs whose emissions are human caused are: carbon dioxide, 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.
Groundwater Source Protection Zone (SPZ)	The Environment Agency has designated SPZs for 2000 groundwater supply sources. The SPZs 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.
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).
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

Term	Definition
	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 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) 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 project.
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

Term	Definition
	construction process (indirect or supply linkage multipliers)
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	This is 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	This is 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	LAmax is 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.

Term	Definition
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.
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 environmental topic will be contained within their respective chapters 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 sites with substantive nature conservation value.
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 effect.

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 **Riverside 1** and **Riverside 2** (once constructed and operational).
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 Planning Policy Framework (NPPF)	The document that sets out Government's planning policies for England and how these are expected to be applied. The NPPF was last revised in July 2021.
National Policy Statement (NPS)	Overarching policy designated under the **Planning Act 2008** (as amended) (PA2008) concerning the planning and consenting of **Nationally Significant Infrastructure Projects** (NSIPs) in the UK.

Term	Definition
National Site Network	An area of land subject to protection through the **Habitats Regulations**, including **Special Areas of Conservation** (SAC) and **Special Protection Areas** (SPA).
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 **Planning Act 2008** (as amended) (PA2008) 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 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

Term	Definition
	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) and approved for operation. During the **operation phase** maintenance will be undertaken. It will remain in its **operation phase** until it is decommissioned.
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	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**.
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.
Planning Act 2008 (PA2008)	The Act (as amended) provides the consenting regime for granting planning and other consents for **Nationally Significant Infrastructure Projects**.
Planning Inspectorate (PINS)	The Government agency responsible for administering applications for development consent under the **Planning Act 2008** (as amended) (PA2008) on behalf of the **Secretary of State**.

Term	Definition
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)	Information which has been compiled by **the Applicant** and is reasonably required for the consultation bodies to develop an informed view of the **likely significant effects** of the development (and of any associated development) is presented within this specific report.
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 Natural Environment and Rural Communities Act (2006) Section 41 **Habitats of Principal Importance (HPI)**.
Proposed Scheme	The scheme for which a **DCO** will be sought. See **Chapter 2: Site and Proposed Scheme Description** 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

Term	Definition
	restricted (i.e. foot, horse back/pedal cycle, non-motorised vehicle, or 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 implementation of **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. Riverside 2 is currently under construction and anticipated to be operational by 2026. Riverside 2 is owned and will be operated by the **Applicant**.
Scoping	An exercise undertaken pursuant to the **EIA Regulations**, to determine the topics to be addressed within the **ES**.
Secondary Aquifer	These include a wide range of rock layers or drift deposits with an equally wide range of water

Term	Definition
	permeability and storage. Secondary Aquifers are subdivided into two types: Secondary A - 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 - 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. The term 'Secondary Undifferentiated' is also used in cases 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 Secretary of State for Energy Security and Net Zero (DESNZ).
Significance	A measure of the importance or gravity of the effect defined by significance criteria specific to the 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 for which the **DCO** will be sought.
Site Boundary	The outer perimeter of the **Site**, as shown on **Figure 1-1 Site Boundary.**
Site of Importance for Nature Conservation (SINC)	Sites of Importance for Nature Conservation are usually selected within a local authority area and support both locally and nationally threatened

Term	Definition
	habitats and **species** that are priorities under the county or UK Biodiversity Action Plan (BAP).
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. Site of Special Scientific Interest (SSSIs) 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 50 metres.
Special Area of Conservation (SAC)	Areas of protected habitats and species as defined in the **Habitats Directive**.
Special Protection Area (SPA)	Sites classified in accordance with Article 4 of the EC Birds Directive (79/409/EEC) which came into force in April 1979. They are classified 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 an application. Includes bodies such as: Environment Agency, Highways Authority, Historic England, Natural England, and Parish Councils, among others.
Study Area	The area, defined for each technical topic, within which the **effect(s)** of the **Proposed Scheme** is assessed.

Term	Definition
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.
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.
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	Sets out the priorities that must be applied when managing waste.
Water Framework Directive (WFD)	European directive which commits member states to achieve good qualitative status of all water bodies.
Waterbody	A discrete body of water forming a physical feature.

Term	Definition
Wildlife and Countryside Act 1981 (as amended)	The principal piece of UK legislation relating to the protection of wildlife.
Zone of Influence (ZOI)	The areas/resources that may be affected by the biophysical changes caused by activities associated with a project.
Zone of Theoretical Visibility (ZTV)	A map, digitally produced, showing areas of land within which, the Proposed Scheme is theoretically visible.

ABBREVIATIONS

Acronym	Definition
ACM	Asbestos Containing Materials
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
APIS	Air Pollution Information Service
AQFA	Air Quality Focus Area
AQMA	Air Quality Management Area
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
ATC	Automatic Traffic Count
BAP	Biodiversity Action Plan
BAT	Best available technology
BES	Building Research Establishment Environmental Sustainability Standard
BGS	British Geological Survey
BNG	Biodiversity Net Gain

Acronym	Definition
BOG	Boil-off Gas
BRE	British Research Establishment
BS	British Standard
BTO	British Trust for Ornithology
CBRN	Chemical, Biological, Radiological and Nuclear
CCI	Community Conservation Index
CCS	Carbon Capture and Storage
CD	Chart Datum
CDE	Construction, Demolition and Excavation
CDM	Construction Design and Management
CEA	Cumulative Effects Assessment
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
CO_2	Carbon Dioxide
COMAH	Control of Major Accident Hazards
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

Acronym	Definition
CSM	Conceptual Site Model
CTMP	Construction Traffic Management Plan
CWTP	Construction Worker Travel Plan
dB	Decibel
DBC	Dartford Borough Council
DCO	Development Consent Order
DEFRA	Department for Environment Food & Rural Affairs
DfT	Department for Transport
DLUHC	Department for Levelling Up, Housing and Communities
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
EC	European Commission
EcIA	Ecological Impact Assessment
EEA	European Economic Area
EHS	Environmental, Health, and Safety
EIA	Environmental Impact Assessment
ELC	European Landscape Convention
EPA	Environmental Protection Act
EPR	Environmental Permitting Regulations
EPUK	Environmental Protection UK

Acronym	Definition
ES	Environmental Statement
FRA	Flood Risk Assessment
GHG	Greenhouse Gas
GIIP	Good International Industry Practice
GLA	Greater London Authority
GLAAS	Greater London Archaeology Advisory Service
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, Third Edition
GPS	Global Positioning System
GVA	Gross Value Added
GWDTE	Groundwater Dependent Terrestrial Ecosystem
H&S	Health and Safety
HAZID	Hazard Identification Study
HEDBA	Historic Environment Desk-Based Assessment
HER	Historic Environment Record
HGVs	Heavy Goods Vehicles
HPI	Habitats of Principal Importance
HSE	Health & Safety Executive
IALA	International Association of Lighthouse Authorities
IAQM	Institute of Air Quality Management
IBA	Incinerator Bottom Ash
IED	Industrial Emissions Directive
IEMA	Institute of Environmental Management and Assessment
IMO	International Maritime Organisation

Acronym	Definition
INNS	Invasive Non-Native Species
IPCC	Intergovernmental Panel on Climate Change
JNCC	Joint Nature Conservation Committee
KCC	Kent County Council
LAQM	Local Air Quality Management
LBAP	Local Biodiversity Action Plan
LBB	London Borough of Bexley
LCA	Landscape Character Area
LCO_2	Liquid Caron Dioxide
LCRM	Land Contamination Risk Management
LiDAR	Light Detection and Ranging
LLAQM.TG(19)	London Local Air Quality Management Technical Guidance
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LSE	Likely Significant Effects
LSOA	Lower Super Output Area
LTP	Local Transport Plan
LVMF	London View Management Framework
LWS	Local Wildlife Sites
MA&D	Major Accidents and Disasters
MAGIC	Multi-Agency Geographic Information System Mapping
MCA	Maritime and Coastguard Agency
MCC	Manual Classified Counts

Acronym	Definition
MCZ	Marine Conservation Zone
MGN	Marine Guidance Notes
MHW	Mean High Water
Mm^2	Million Square Meters
Mm^3	Million Cubic Meters
MOL	Metropolitan Open Land
Mt	Million Tonnes
MW	Megawatt
MWe	Megawatt electrical
NCA	National Character Area
NDC	Nationally Determined Contribution
NERC	The Natural Environment and Rural Communities Act 2006
NGR	National Grid Reference
NH	National Highways
NHLE	National Heritage List for England
NM	Nautical Miles
NMHR	National Marine Heritage Record
NPPF	National Planning Policy Framework
NPS EN-1	Overarching National Policy Statement for Energy
NPS EN-3	National Policy Statement for Renewable Energy Infrastructure
NPSE	Noise Policy Statement for England
NRMM	Non-Road Mobile Machinery
NSIP	Nationally Significant Infrastructure Project

Acronym	Definition
NSR	Noise Sensitive Receptor
NTM	National Transport Model
OD	Ordnance Datum
OS	Ordnance Survey
OSPAR Convention	The Convention for the Protection of the Marine Environment in the North-East Atlantic 1992
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
PIC	Personal Injury Collision
PINS	Planning Inspectorate
PM	Particulate Matter
PPE	Personal Protective Equipment
PPT	Parts per Thousand
PRoW	Public Right of Way
PSZ	Public safety zones
RBD	River Basin District
RBMP	River Basin Management Plan
RCP	Representative Concentration Pathway
RFC	Ratio of Flow to Capacity

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
SoS	Secretary of State
SPA	Special Protection Area
SPG	Supplementary Planning Guidance
SPI	Species of Principal Importance
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
SWMP	Site Waste Management Plan
TA	Transport Assessment
TCPA	Town and Country Planning Act
TEMPro	Trip End Model Presentation Program
TFI	Task Force on National Greenhouse Gas Inventories
TfL	Transport for London
TLRN	Transport for London Road Network
TPO	Tree Preservation Order
TraC	Transitional and Coastal
TVIA	Townscape and Visual Impact Assessment

Acronym	Definition
UDP	Unitary Development Plan
UKBAP	UK Biodiversity Action Plan
UKC	Underkeel Clearance
UKCP21	UK Climate Projections 2021
UKHSA	UK Health Security Agency
VP	Viewpoint
WCA	The Wildlife and Countryside Act 1981 (as amended)
WFD	Water Framework Directive
WHO	World Health Organisation
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

1. INTRODUCTION

1.1. BACKGROUND

1.1.1. Cory Environmental Holdings Limited (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 the Cory Riverside Campus, located adjacent to the River Thames at Belvedere in the London Borough of Bexley (LBB). Riverside 1, an energy from waste (EfW) facility generating up to 80.5 megawatt (MW) of electricity, has been operational since 2011[1]. 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. Together, 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. These facilities will form a core 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.

1.1.5. Cory (hereafter referred to as 'the Applicant') intends to construct and operate the Cory Decarbonisation Project to be linked with the River Thames. It comprises two key projects:

- the Carbon Capture and Storage Project: the construction of infrastructure to capture at least 95% of carbon emissions from Riverside 1 and Riverside 2. The Carbon Capture and Storage Project will be one of the largest carbon capture, and storage (CCS) projects in the UK; and
- the Hydrogen Project, utilising up to 50MW of the electricity generated by Riverside 1 and Riverside 2 (which is already low carbon and with the installation of CCS will become carbon negative), through an electrolyser, to produce 39MW of hydrogen production (21.6 tonnes per day of hydrogen).

[1] 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.

1.1.6. Together, the Carbon Capture and Storage Project, the Hydrogen Project, the associated Proposed Jetty, and the ancillary infrastructure and equipment are referred to as the 'Proposed Scheme'. The extent of the Proposed Scheme is 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. A full description of the Site and the Proposed Scheme is presented in **Chapter 2: Site and Proposed Scheme Description**.

1.1.9. WSP has been commissioned by the Applicant to prepare an Environmental Impact Assessment (EIA) Scoping Report in support of its request to the Secretary of State (SoS) for an EIA Scoping Opinion.

The EIA Scoping Report is based on the EIA Scoping Boundary in **Figure 1-1 – Site Boundary**. The Site Boundary (**Figure 1-1 – Site Boundary**) 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 DCO Application. **Figure 1-2** shows the Site Boundary with satellite imagery background. Further work is also being undertaken in respect of the ecological mitigation areas that may be required for the Proposed Scheme, which may expand the Site Boundary. As any such areas would be put in place to mitigate the impacts of the Proposed Scheme in a similar fashion to mitigation areas that would be located within the current Site Boundary (and thus are accounted for in how this Scoping Report considers how the Proposed Scheme will be assessed), it is not considered that changes to the Site Boundary of this nature would necessitate the need for re-scoping at a later date. However, this will be kept under review by the Applicant as the Proposed Scheme progresses.

N

The London Borough of Barking and Dagenham

The London Borough of Bexley

The London Borough of Havering

Halfway Reach

River Thames

Rainham Creek

Riverside 1

Riverside 2

Norman Rd

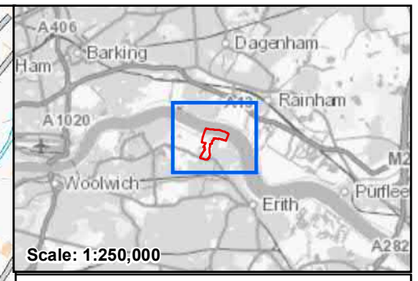
Lower Belvedere

Eastern Way A2016

Education Facility

0 50 100 200 300 400 500

Metres



Legend

- Site Boundary
- Local Authority Boundary

REVISION	DRAWN	CHECKED	APPROVED	DATE
P00	NB	JH	RA	30/03/2023

DESCRIPTION: FIRST DRAFT ISSUE

PROJECT TITLE:
CORY DECARBONISATION PROJECT

DRAWING TITLE:
FIGURE 1-1:
SITE BOUNDARY LOCATION PLAN

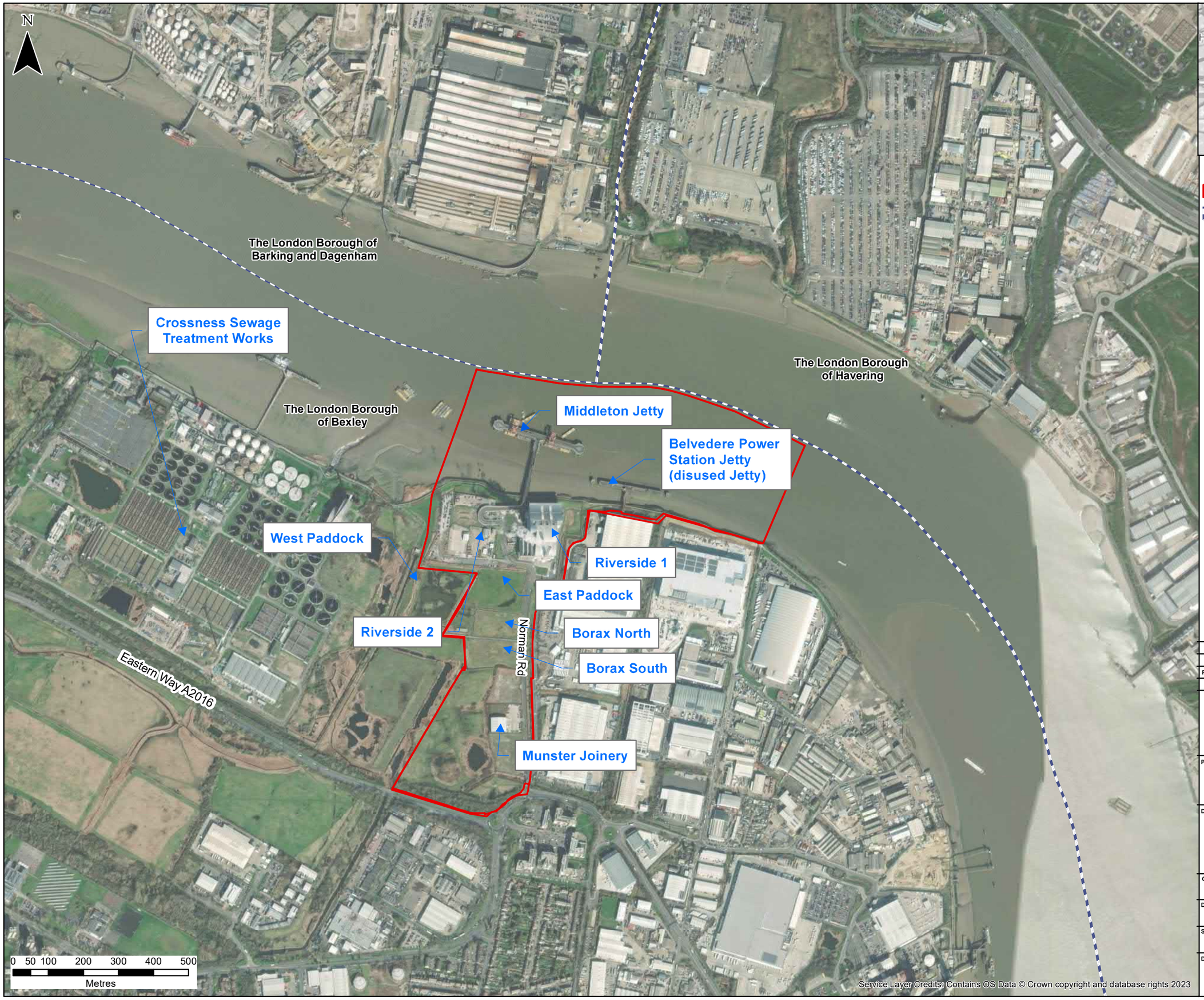
CONFIDENTIALITY: PUBLIC

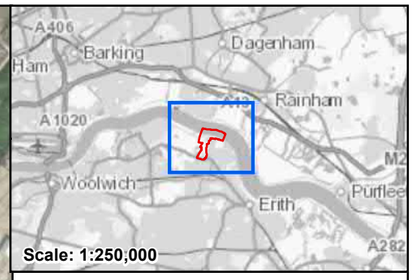
DRAWN:	CHECKED:	APPROVED:	AUTHORISED:
AB	JH	RA	JW

SCALE @ A3 SIZE:	DATE:	REVISION:
1:10,000	30/03/2023	P00

DRAWING NUMBER:
70090329-WSP-00-XX-RP-ES-1802-P01-S0

\\uk.wspgroup.com\central data\Projects\70090xxx\70090329 - Cory CCUS DCO Delivery\03 WIP\GIS\13_GSS\132_GIS\ArcGIS\MXDs\EIA Scoping Report\Figure 1-1 Site Boundary Location Plan.mxd





Legend

- Site Boundary
- Local Authority Boundary

REVISION	DRAWN	CHECKED	APPROVED	DATE
P00	NB	JH	RA	11/04/2023

DESCRIPTION: FIRST DRAFT ISSUE

PROJECT TITLE:
CORY DECARBONISATION PROJECT

DRAWING TITLE:
FIGURE 1-2
SATELLITE IMAGERY OF THE SITE BOUNDARY PLAN

CONFIDENTIALITY: PUBLIC

DRAWN:	CHECKED:	APPROVED:	AUTHORISED:
NB	JH	RA	JW

SCALE @ A3 SIZE:	DATE:	REVISION:
1:10,000	11/04/2023	P00

DRAWING NUMBER:
70090329-WSP-00-XX-RP-ES-1801-P01-S0

\\uk.wspgroup.com\central data\Projects\70090xxx\70090329 - Cory CCUS DCO Delivery\03 WIP\GIS\13_GSS\132_GIS\ArcGIS\MXDs\EIA Scoping Report\Figure 1-2 Satellite Imagery of the Site Boundary Plan.mxd

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 PA2008, that the Proposed Scheme should be treated as development for which development consent under the Planning Act 2008 (as amended) (PA2008) is required (**Ref 1.1**). The SoS was satisfied that (**Ref 1.2**):

- *"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 Planning Act 2008; 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"* (**Ref 1.2**).

1.2.3. The SoS outlined the following reasons as to why the Proposed Scheme should be treated as development for which development consent is required (**Ref 1.2**):

- *"Both the carbon capture and storage and hydrogen elements of the Proposed Project will play an important role in enabling an energy system that meets the UK's commitment to reduce carbon emissions and the Government's objectives to create a secure, reliable and affordable energy supply for consumers.*

  The carbon capture element of the Proposed Project would provide and support the decarbonisation of energy from waste derived carbon dioxide (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. The Secretary of State does not consider that, in this case, the carbon capture element of the Proposed Project constitutes an extension of the generating station.
- *The hydrogen element of the Proposed Project would provide and support the production of viable hydrogen facilities that would enable the provision of regular hydrogen supply to heavy goods vehicles and vessels as both forms of transport seek to decarbonise and will make an important contribution to the overall 5GW target set out in the Hydrogen Strategy.*

  By progressing the development through the Planning Act 2008 development consent process, it would provide the certainty of a single, unified consenting process and fixed timescales."

1.3. DEFINITION OF AN EIA

1.3.1. The term 'Environmental Impact Assessment' ('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. The process and content of EIA is summarised in Regulation 5 of the EIA Regulations (**Ref 1.3**). 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.

1.4.2. The Proposed Scheme involves an installation for the capture of CO_2 streams for the purposes of geological storage and so is deemed to constitute EIA development and to require EIA. Consequently, it is deemed to constitute EIA development and to require EIA. As detailed in **Chapter 2: Site and Proposed Scheme Description** the remit of the Proposed Scheme for which development consent will be sought also includes a Hydrogen Project, an associated Proposed Jetty, and ancillary infrastructure and equipment which will be collectively considered in the EIA.

1.4.3. A Regulation 8 (of the EIA Regulations) (**Ref 1.4**) letter has been submitted to the SoS along with this EIA Scoping Report and confirms that the Applicant intends to submit an application for development consent, which will include an ES, in Q1 2024.

1.5. NATIONAL POLICY STATEMENTS

1.5.1. As the recent case of EfW Group Ltd v SSBEIS (**Ref 1.5**) 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. The Section 35 Direction dictates that they are developments for which development consent is required under the PA2008. That case went on to say that National Policy Statements (NPS) (**Ref 1.6**) (and in particular NPS EN-1 (**Ref 1.7**) and NPS EN-3 (**Ref 1.8**)) 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 (**Ref 1.10**)).

1.5.2. The consequence of EfW Group Ltd v SSBEIS (**Ref 1.5**) is that until the Emerging NPSs for Energy are adopted (as both the 2021 and 2023 drafts for consultation include wording which indicate that Section 35 projects are caught by those NPSs) Section 104 of the PA2008, which requires the SoS to determine applications in accordance with the relevant NPSs, does not apply to energy projects that are the subject of a Section 35 Direction; as they cannot be a *"development of the description"* to which the NPSs have effect. As such, at the time of writing, the

application for the Proposed Scheme would be dealt with by Section 105 of the PA2008 (**Ref 1.1**).

1.5.3. Section 105 of the PA2008 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 both the existing and emerging NPS EN-1 and NPS EN-3 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.

1.5.5. It is acknowledged that revised draft NPSs for EN-1 and EN-3 were released on the 30th March 2023 which further support the deployment of both carbon capture and storage and hydrogen production within the UK. These revised draft NPSs will be reviewed as part of the PEIR and preparation of the ES. However, as they were published just prior to the finalisation of this Scoping Report, the technical chapters of this Report still refer to the 2021 drafts in respect of technical matters.

1.5.6. The PEIR and ES will also consider the other Government policy announcements made on 30 March 2023, including the emphatic support given to CCS projects as forming a vital part of the UK's strategy to meet net zero.

1.6. PURPOSE OF THE EIA SCOPING REPORT

1.6.1. The purpose of this EIA Scoping Report is to ensure that the subsequent EIA is focused on the key impacts likely to give rise to significant effects, and to obtain agreement on the EIA approach and scope. As well as identifying elements to be considered in the EIA, this Report also identifies those elements that are not considered necessary to assess further. This approach is in line with the general aim to undertake proportionate EIA, as advocated by industry best practice and as set out in paragraph 5.10 of the Planning Inspectorate's (PINS) Advice Note 7 (**Ref 1.10**).

1.6.2. This Report seeks to establish the overall framework for the EIA for the Proposed Scheme in relation to the environmental impacts and associated effects, with the ES to be based on this EIA Scoping Report and the Scoping Opinion received. However, the exact scope of the EIA will also be influenced by the on-going design evolution of the Proposed Scheme, baseline data collection (e.g. field surveys etc.) and consultation with stakeholders. Where further evidence justifies a change to the scope of the EIA, this will be explained in the ES along with confirmation of whether the change has been agreed with relevant consultees.

1.6.3. The EIA Regulations (Regulation 10(3)) prescribe the information that a request for an EIA Scoping Opinion must include (**Ref 1.11**). **Table 1-1** presents those information requirements and where each can be found in this Report.

Table 1-1: Information Required to Accompany a Request for an EIA Scoping Opinion

Information Required	Location within this Report
A plan sufficient to identify the land.	Figure 1-1 – Site Boundary Figure 1-2 – Satellite Imagery of the Site Boundary
A description of the nature and purpose of the development, including its location and technical capacity.	Chapter 1: Introduction Chapter 2: Site and Proposed Scheme Description
An explanation of the likely significant effects of the development on the environment.	Chapters 4-20 of this Report

1.6.4. In addition to the above, Regulation 10(3) of the EIA Regulations also requires *'such other information or representations as the person making the request may wish to provide or make'.* This additional information is set out in **Table 1-2** below.

Table 1-2: Other Information Provided within this EIA Scoping Report

Information Required	Location within this Report
An overview of the conditions present on site and in the surrounding area, together with a brief overview of the relevant planning policy context.	Chapter 1: Introduction Chapter 2: Site and Proposed Scheme Description
Outline of the scope and assessment methodology (including the significance criteria to be adopted) for assessing the likely significant environmental effects to be employed for each aspect to be reported in the ES.	Chapter 3: EIA Methodology Chapters 4-20 of this Report
The approach to dealing with alternatives.	Chapter 3: EIA Methodology
The approach to undertaking the cumulative assessment.	Chapter 20: Cumulative Effects
The proposed approach to the EIA and an appraisal of the key environmental aspects and matters to be covered in the EIA (i.e., "scoped	Chapters 3-20 of this Report

Information Required	Location within this Report
in") and the aspects and matters not requiring further consideration (i.e., "scoped out").	
The proposed structure and format of the ES which will comprise three main parts: • **Volume 1 – Main Text and Figures** • **Volume 2 – Technical Appendices** • **Volume 3 – Non-Technical Summary**	Chapter 3: EIA Methodology

1.6.5. The outputs of the EIA will be twofold:

- A Preliminary Environmental Information Report (PEIR), produced in connection with the formal statutory consultation for the Proposed Scheme. The PEIR will present the current understanding of the potential likely significant effects of the Proposed Scheme at the time of the consultation and its purpose will be to supply information that enables interested parties, including members of the public, local authorities and statutory bodies, to understand the likely significant effects of the Proposed Scheme to the environment so that they can provide meaningful feedback; and
- The PEIR will be followed by the ES, which will be produced and submitted as part of the application for a DCO for the Proposed Scheme. The ES will report on a detailed assessment of the likely significant effects resulting from the Proposed Scheme as well as setting out the proposed mitigation measures to be implemented and the residual effects anticipated to arise following the implementation of that mitigation.

1.7. REFERENCES

Ref 1.1: UK Gov. (2008). 'Planning Act 2008'. Available at: https://www.legislation.gov.uk/ukpga/2008/29/contents

Ref 1.2: Secretary of State for Business, Energy and Industrial Strategy. (2022). 'Direction by The Secretary of State Under Section 35 of The Planning Act 2008 Relating to The Cory Decarbonisation Project'. Available at: https://infrastructure.planninginspectorate.gov.uk/projects/southeast/cory-decarbonisation-project/?ipcsection=docs

Ref 1.3: UK Gov. (2017). 'Regulation 5 of the EIA Regulations'. Available at: https://www.legislation.gov.uk/uksi/2017/571/regulation/5/made

Ref 1.4: UK Gov. (2017). 'Regulation 8 (of the EIA Regulations)'. Available at: https://www.legislation.gov.uk/uksi/2017/571/regulation/8/made

Ref 1.5: High Court. (2021). 'Infrastructure planning—an error of law in the process of determining applications did not justify a quashing of the decisions (EFW Group Ltd v SSBEIS)'. Available at: https://www.lexisnexis.co.uk/legal/news/infrastructure-planning-an-error-of-law-in-the-process-of-determining-applications-did-not-justify-a

Ref 1.6: The Planning Inspectorate. (2023). 'National Policy Statements (NPS)'. Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/national-policy-statements/

Ref 1.7: Department of Energy & Climate Change. (2011). 'Overarching National Policy Statement for Energy (NPS EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 1.8: Department of Energy & Climate Change. (2011). '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/47856/1940-nps-renewable-energy-en3.pdf

Ref 1.9: Department for Transport. (2014). 'National Policy Statement for National Networks (NN) (NPS NN)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387222/npsnn-print.pdf

Ref 1.10: National Infrastructure Planning. (2020). 'Advice Note 7 (Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements'. Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-seven-environmental-impact-assessment-process-preliminary-environmental-information-and-environmental-statements/

Ref 1.11: UK Gov. (2017). 'Regulation 10 of the EIA Regulations'. Available at: https://www.legislation.gov.uk/uksi/2017/571/regulation/10/made

2. SITE AND PROPOSED SCHEME DESCRIPTION

2.1. SITE DESCRIPTION

2.1.1. The Site Boundary is shown in **Figure 1-1** and **1-2** (**Chapter 1: Introduction**). The site is located in Belvedere, within the LBB.

2.1.2. 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 jetty) 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 southern perimeter contains deciduous woodland, which borders the A2016 Picardy Manorway / Eastern Way.

2.1.3. The main access route to the Site is from Norman Road, located off the A2016 Picardy Manorway.

2.1.4. Further information and details on the facilities within the Site Boundary, destinations, surrounding Public Rights of Way (PRoW) and the surrounding area are described below.

2.1.5. As explained in **Chapter 1: Introduction** the Site Boundary is likely to be refined following further environmental assessment and consultation, ahead of submission of the DCO Application.

RIVERSIDE CAMPUS

2.1.6. The Cory Riverside Campus consists of Riverside 1 and Riverside 2. It is located within the Site Boundary.

2.1.7. Riverside 1 is one of the largest EfW facilities in the UK, with an electricity generating capacity of 80.5MW. Riverside 1 received 782,000 tonnes of non-recyclable waste in 2021 (**Ref 2.1**).

2.1.8. At the time of writing Cory is constructing a second EfW facility adjacent (west) to Riverside 1, known as Riverside 2. Riverside 2 will be operational in 2026 and has an electricity generating capacity of approximately 76MW. Riverside 2 will be one of the most efficient EfW facilities in the UK, processing approximately 655,000 tonnes of non-recyclable waste.

2.1.9. Combined, Riverside 1 and Riverside 2 will generate enough electricity to power approximately 320,000 homes each year (**Ref 2.1**). The two sites combined represent 98% of the Applicant's total carbon footprint; hence the requirement to extend the Riverside Campus to incorporate carbon capture and consider low carbon hydrogen production technology (the Proposed Scheme).

2.1.10. In line with Riverside 1, Riverside 2 will utilise the well-established moving grate incineration technology (**Ref 2.2**). This technology has been successfully deployed across numerous operational EfW facilities in the UK.

2.1.11. The Riverside Campus is, uniquely, located on and utilises the River Thames. The majority of waste delivered to Riverside 1 is transported via barge shipment along the River Thames, with future waste to be delivered to Riverside 2 via the same approach. 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 (**Ref 2.1**). Once operational the Riverside 2 IBA will be exported in the same way.

2.1.12. Riverside 1 and Riverside 2 are both located within the Site Boundary as the Proposed Scheme 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 towards the Carbon Capture and Storage Project;
- Steam supply – modifications to Riverside 1 and Riverside 2 will be required to supply steam to the Carbon Capture and Storage Project; and
- Electrical supply – electrical connections will be made in order for the power generated by Riverside 1 and Riverside 2 to supply the parasitic load of the Carbon Capture and Storage Project, Hydrogen Project, the associated Proposed Jetty, and the ancillary infrastructure and equipment.

EXISTING JETTIES

2.1.13. The Site Boundary contains two existing jetties that extend into the River Thames: the Middleton Jetty is located adjacent (north) of Riverside 1; and the second, Belvedere Power Station Jetty (disused jetty) is located adjacent (north) of Iron Mountain Records Storage Facility. Both jetties bridge across the Thames Path (Footpath (FP) 3). The Middleton Jetty is within the Site Boundary to ensure overall integration with the existing maritime infrastructure. The Belvedere Power Station Jetty (disused jetty) is within the Site Boundary as it is a potential location for the Proposed Jetty, described in **Section 2.2**.

2.1.14. The Middleton Jetty is approximately 280m in length, which allows the Applicant to receive approximately 75% of the incoming waste via tug pulled barges and allows the Applicant to remove the equivalent of 100,000 Heavy Goods Vehicles (HGVs) from the road with the Riverside 1 throughput alone. In total, Middleton Jetty currently receives approximately 2,100 to 2,200 tonnes of waste per day. The waste is unloaded at Middleton Jetty and transferred on dock tractors and trailers which move the waste to the tipping hall (**Ref. 2.3**). The Middleton Jetty will also be used for the receipt of waste for Riverside 2, once operational.

CROSSNESS LOCAL NATURE RESERVE

2.1.15. The Crossness Local Nature Reserve (LNR) which is approximately 25.5 hectares in size, is part of the Erith Marshes Site of Importance for Nature Conservation (SINC) (**Ref 2.4**). The Crossness LNR is adjacent (east) to the Crossness Sewage Treatment Works and is owned and managed by Thames Water, shown in **Figure 2-3**.

2.1.16. Crossness LNR contains areas of grazing marsh (**Ref 2.5**). It also has ponds and ditches, and areas of scrub and rough grassland. There are footpaths (FP 1, 2 and 3) through the eastern part of the site, accessed from Norman Road and the A2016 Picardy Manorway.

2.1.17. A portion of the Crossness LNR is proposed to be included in the Site Boundary.

DESIGNATED OPEN SPACE

2.1.18. The Site Boundary contains Metropolitan Open Land (MOL) a designated open space intended to be protected as an area of landscape, recreation, nature conservation or scientific interest (**Ref 2.6** and **Ref 2.7**). The MOL stretches south of the A2016 Picardy Manorway / Eastern Way, and west of the Site Boundary, shown in **Figure 2-1**.

SITE OF IMPORTANCE FOR NATURE CONSERVATION

2.1.19. There are several Site of Importance for Nature Conservation (SINCs) within and surrounding the Site Boundary, shown in **Figure 2-3**. SINCs are of particular importance to wildlife and biodiversity. The Erith Marshes SINC is located within the Site Boundary, stretching south of the A2016 Picardy Manorway / Eastern Way and classified as being of Metropolitan Importance (**Ref 2.4**). The Site Boundary also contains the River Thames and tidal tributaries SINC, classified as being of Metropolitan Importance (**Ref 2.4**). The Belvedere Dykes SINC is located adjacent to Riverside 1 and Norman Road, to the east of the Site Boundary. The Belvedere Dykes SINC is classified as being of Borough Importance (**Ref 2.6** and **Ref 2.7**).

PUBLIC RIGHTS OF WAY

2.1.20. The following Public Rights of Way (PRoW) footpaths run directly through the Site Boundary, these are shown in **Figure 2-1**:

- FP2
- FP3
- FP4

SURROUNDING AREA

2.1.21. The Site Boundary is surrounded by many industrial estates within Belvedere; which is considered a strategic industrial zone. These estates include:

- Hailey Road Industrial Estate, approximately 70m south of the Site Boundary;
- Waldrist Way Industrial Estate, approximately 350m southwest of the Site Boundary;
- Crabtree Manorway North, approximately 500m east of the Site Boundary;
- Fishers Way Industrial Estate, approximately 600m east of the Site Boundary; and
- River Wharf Business Park, approximately 900m east of the Site Boundary.

2.1.22. Individual business operations adjacent to the Site Boundary include Iron Mountain Records Storage Facility and Asda Belvedere Distribution Centre located approximately 60m east of the Site Boundary. The Amazon UK DBR1, Lidl Warehouse / Belvedere Regional Distribution Centre, Belvedere Wharf, Erith Driving Test Centre and Asda ASC Recycling Centre are located approximately 260m east of the Site Boundary.

2.1.23. 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.

2.1.24. The residential area of Belvedere, which includes Franks Park and Bexley College, is located, at its closest point, approximately 155m south of the Site Boundary. Thamesmead residential area is located approximately 1.7km North-West of the Site Boundary. Rainham Landfill is located approximately 2km east of the Site Boundary. There are some community features such as the Morgan Public House approximately 55m south of the Site Boundary (on the A2016 Picardy Manorway), the Travelodge London Belvedere located approximately 90m southeast from the Site Boundary along with several churches and primary schools. Further information on residential properties and community facilities can be found in **Chapter 5: Noise and Vibration** and **Chapter 13: Population, Health, and Land Use**.

2.1.25. The road network adjacent to the Site Boundary includes Norman Road to the east, which connects with the A2016 Picardy Manorway to the south. Norman Road provides access to the Riverside Campus, the Iron Mountain Records Storage Facility and the Asda Belvedere Distribution Centre. The Site Boundary is located in close proximity to bus and rail services, with bus stops and the Belvedere Railway Station located in the surrounding area.

2.1.26. The Lesnes Abbey Woods LNR is located approximately 1.2km south of the Site Boundary. The Rainham Marshes LNR and Inner Thames Marshes Site of Special Scientific Interest (SSSI) are located approximately 1.75km east of the Site Boundary, across the River Thames. There are various other sites designated for their biodiversity value within the respective Study Areas, see **Chapter 6: Terrestrial Biodiversity** and **Chapter 7: Marine Biodiversity** for further details.

2.1.27. Crossness Conservation Area is located 760m to the west of the Site Boundary and includes three listed buildings, all of which were constructed in the 1860s. The Grade II listed No. 4 Jetty and Approach at Dagenham Dock is located 750m North-West of the Site Boundary. The location of these assets is shown in **Figure 2-4**. The Site Boundary lies within the Thamesmead and Erith Marshes Archaeological Priority Area, Further information on heritage assets can be found in **Chapter 8: Historic Environment**.

2.1.28. The Site Boundary is located in Flood Zone 2, as shown on **Figure 2-2**. There are several main rivers, ordinary watercourses and ponds located within the Site Boundary and the surrounding area. The River Thames, Mulberry Way River and Tributaries and Belvedere Stream are all located within the Site Boundary. Further information on the water environment can be found in **Chapter 10: Water Environment and Flood Risk**.

N

The London Borough of Barking and Dagenham

The London Borough of Bexley

The London Borough of Havering

River Thames

Halfway Reach

Rainham Creek

Lower Belvedere

Erith Reach

Eastern Way

Norman Road

Crabtree Manorway N

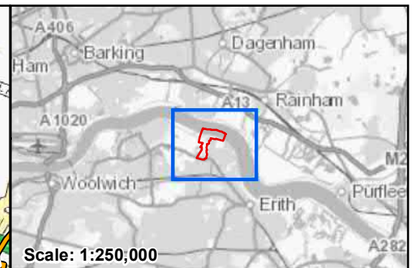
Fisher's Way

Education Facility

Belvedere

0 50 100 200 300 400 500

Metres



Legend

- Site Boundary
- 500 m Study Area
- Public Rights of Way
- National Cycle Network
- Local Authority Boundary
- Metropolitan Open Land

REVISION	DRAWN	CHECKED	APPROVED	DATE
P00	NC	JH	RA	30/03/2023

DESCRIPTION: FIRST DRAFT ISSUE

PROJECT TITLE:
CORY DECARBONISATION PROJECT

DRAWING TITLE:
FIGURE 2-1:
ENVIRONMENTAL CONSTRAINTS PLAN:
PUBLIC RIGHTS OF WAY CYCLE ROUTES AND METROPOLITAN OPEN LAND

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70090329-WSP-00-XX-RP-EN-0101-P01-S0

\\uk.wspgroup.com\central data\Projects\70090xxx\70090329 - Cory CCUS DCO Delivery\03 WIP\GIS\13_GSS\132_GIS\ArcGIS\MXDs\EIA Scoping Report\Figure 2-1 Environmental Constraints Plan (500m buffer).mxd

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0 250 500 1,000
Metres

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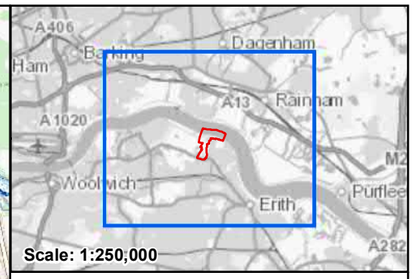

Legend

- Site Boundary
- 500 m Study Area
- WFD River Water Bodies
- Flood Zone 2
- Flood Zone 3

REVISION	DRAWN	CHECKED	APPROVED	DATE
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DESCRIPTION: FIRST DRAFT ISSUE				

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PROJECT TITLE:
CORY DECARBONISATION PROJECT

DRAWING TITLE:
FIGURE 2-2:
ENVIRONMENTAL CONSTRAINTS PLAN:
WATER BODIES AND FLOOD ZONES

CONFIDENTIALITY: PUBLIC

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\\uk.wspgroup.com\central data\Projects\70090xxx\70090329 - Cory CCUS DCO Delivery\03 WIP\GIS\13_GSS\132_GIS\ArcGIS\MXDs\EIA Scoping Report\Figure 2-2 Environmental Constraints Plan (500m buffer)_PT2.mxd

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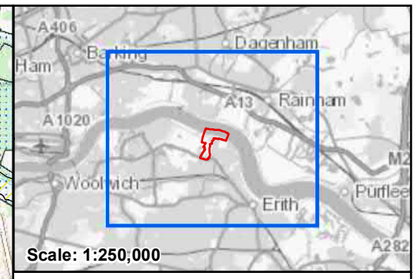
River Thames and Tidal Tributaries SINC

Belvedere Dykes SINC

Crossness Local Nature Reserve (LNR)

Erith Marshes SINC

0 250 500 1,000
Metres



Legend

- Site Boundary
- 2 km Study Area
- Sites of Special Scientific Interest
- Local Nature Reserve (LNR)
- Sites of Importance for Nature Conservation (SINC)

REVISION	DRAWN	CHECKED	APPROVED	DATE
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DESCRIPTION: FIRST DRAFT ISSUE

PROJECT TITLE:
CORY DECARBONISATION PROJECT

DRAWING TITLE:
FIGURE 2-3:
ENVIRONMENTAL CONSTRAINTS PLAN:
STATUTORY AND NON-STATUTORY ECOLOGICAL DESIGNATED SITES

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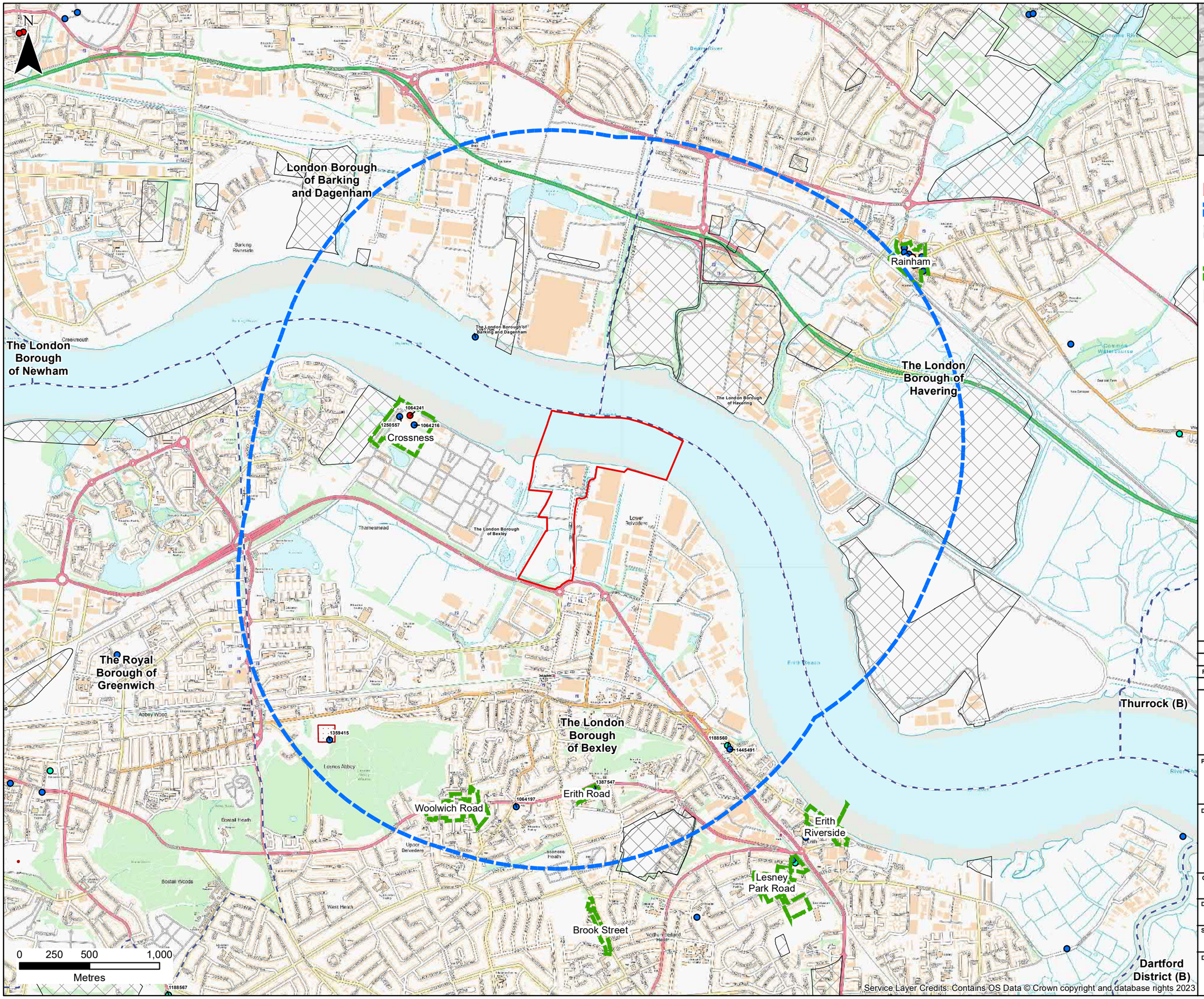
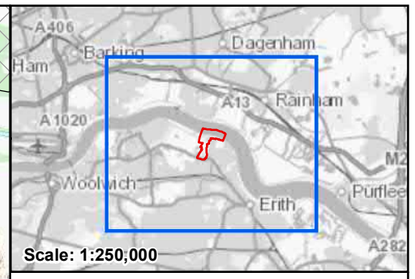
\\uk.wspgroup.com\central data\Projects\70090xxx\70090329 - Cory CCUS DCO Delivery\03 WIP\GIS\13_GSS\132_GIS\ArcGIS\MXDs\EIA Scoping Report\Figure 2-3_Environmental Constraints Plan (2km Buffer).mxd





Legend

- Site Boundary
- 2 km Study Area
- Local Authority Boundary
- Historic Landfill Sites
- Conservation Area
- Scheduled Monument
- Grade I (Listed Building)
- Grade II (Listed Building)
- Grade II* (Listed Building)

REVISION	DRAWN	CHECKED	APPROVED	DATE
P00	AB	JF	RA	29/03/2023

DESCRIPTION: FIRST DRAFT ISSUE

PROJECT TITLE:
CORY DECARBONISATION PROJECT

DRAWING TITLE:
FIGURE 2-4:
ENVIRONMENTAL CONSTRAINTS PLAN
HERITAGE FEATURES

CONFIDENTIALITY: PUBLIC

DRAWN:	CHECKED:	APPROVED:	AUTHORISED:
AB	JF	RA	JW

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70090329-WSP-00-XX-RP-EN-0202-P01-S0

2.2. PROPOSED SCHEME DESCRIPTION

2.2.1. The Applicant intends to construct, operate and maintain a decarbonisation hub on the River Thames, comprising two key projects: the Carbon Capture and Storage Project and the Hydrogen Project. Together, these projects are referred to as the 'Proposed Scheme'. The Proposed Scheme also includes a Proposed Jetty and ancillary infrastructure and equipment.

2.2.2. A description of the projects along with the Proposed Jetty and the ancillary infrastructure and equipment is provided below. The sections focus on the Carbon Capture and Storage Project and Hydrogen Project, with reference made to the relevant elements of the Proposed Jetty within each.

CARBON CAPTURE AND STORAGE PROJECT

Carbon Capture and Storage Policy Position

2.2.3. The UK Government has recognised that installation of new renewable electricity production can only go 'so far' to meet the net zero target and avoid major climate change impacts, with these impacts further heightened in the context of the Intergovernmental Panel on Climate Change (IPCC) 2022 report (**Ref 2.8**). As such, a key part of achieving net zero and mitigating the future impacts of climate change is the introduction of carbon capture and storage infrastructure, both to decarbonise existing industrial emitters and to facilitate the provision of negative emissions to offset industries that cannot decarbonise completely. Carbon capture and storage infrastructure is recognised by the Government as key in the net zero transition in the:

- Energy White Paper (**Ref 2.9**);
- Clean Growth Strategy (including its CCS Action Plan) (**Ref 2.10**);
- Industrial Decarbonisation Strategy (**Ref 2.11**);
- Draft Overarching National Policy Statement for Energy (EN-1) (**Ref 2.12**);
- Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) (**Ref 2.15**); and
- British Energy Security Strategy (**Ref 2.13**).

2.2.4. In this context, it is notable that by 2026 (when construction of Riverside 2 is expected to be complete) the combined emissions of Riverside 1 and Riverside 2 will be responsible for the single largest source of EfW derived CO_2 emissions in the UK, in the order of 1.5 million tonnes (Mt) of CO_2 per year. Combined, Riverside 1 and Riverside 2 are therefore a key CO_2 emitter within the UK.

2.2.5. The Carbon Capture and Storage Project will capture up to 95% of these emissions, the equivalent to approximately 1.3Mt CO_2 per year (**Ref 2.14**). Furthermore, with the feedstock to Riverside 1 and Riverside 2 comprising >50% biogenic content, the Carbon Capture and Storage Project would result in net-negative CO_2 emissions of approximately 0.6Mt per year of CO_2 (**Ref 2.14**).

2.2.6. 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.

2.2.7. The stages and components of the Carbon Capture and Storage Project are described below.

Carbon Capture and Storage Project

2.2.8. The Carbon Capture and Storage Project will broadly consist of the following:

- Stage 1 – Flue Gas Supply
- Stage 2 – Carbon Capture Plant
- Stage 3 – Compression, Conditioning and Liquefaction
- Stage 4 – Liquefied CO_2 Buffer Storage
- Stage 5 – Liquefied CO_2 Loading System

2.2.9. It is proposed that the Carbon Capture and Storage Project is a 2-train design with two independent systems for Stages 1 to 3 that could be applied separately to Riverside 1 and Riverside 2. The Liquefied CO_2 Buffer Storage (Stage 4) and Liquid CO_2 Loading System (Stage 5) shall be common for the Carbon Capture and Storage Project.

2.2.10. The stages are shown in **Figure 2-5** and described below. Note the stages shown within the dotted boundary are those which are on a 2-train basis. At the end of **Section 2.2** a short description is also provided of the ancillary equipment necessary to facilitate the operation of the Proposed Scheme, including the Carbon Capture and Storage Project.

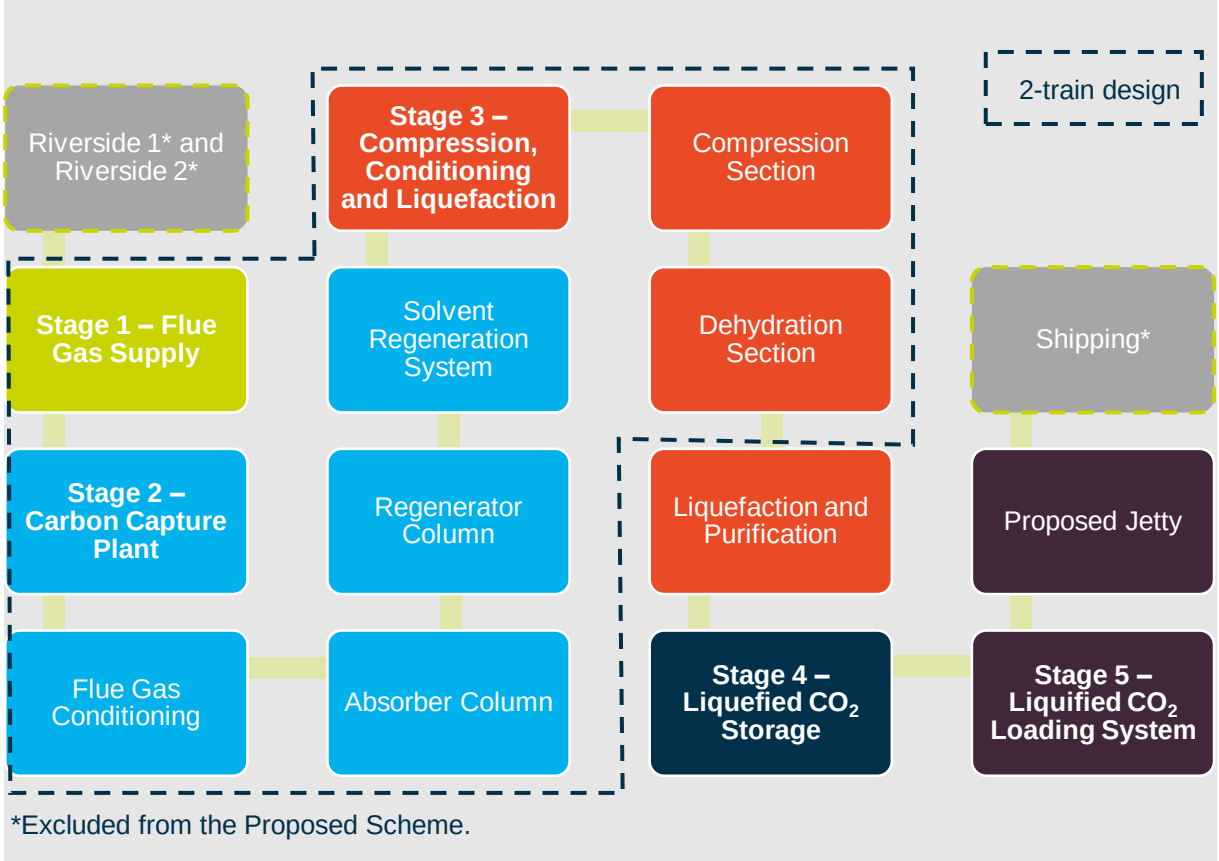

Figure 2-5: Carbon Capture and Storage Project

Stage 1 – Flue Gas Supply

2.2.11. Tie-ins to the existing flue gas lines for Riverside 1 and Riverside 2 will be required, prior to the exhaust stacks, to route the flue gas via new ducting to the Carbon Capture Plant (Stage 2). The new tie-ins to the flue gas lines will include a damper (shut-off valve) to enable flue gas to be directed to either the Carbon Capture Plant or to the respective Riverside 1 or Riverside 2 stack, if the Carbon Capture Plant is not able to operate.

Stage 2 – Carbon Capture Plant

2.2.12. The Carbon Capture Plant will use chemical absorption to separate CO_2 from the flue gas. The solvent used for the chemical absorption will be amine-based.

2.2.13. An induced draft fan will be installed within the Carbon Capture Plant boundary to increase the pressure of the flue gas and overcome the pressure drop across the Carbon Capture Plant.

2.2.14. Flue gas conditioning will consist of a direct contact cooler with cooling supplied via circulating cooling water. This will cool and condense water out of the saturated flue gas, as well as treat residual components within the flue gas prior to it reaching the Absorber Column.

2.2.15. In the Absorber Column the cooled flue gas will move upwards through the column. The amine-based solvent will be supplied from the top of the Absorber Column. As the flue gas moves upwards through the Absorber Column the CO_2 within the flue gas will be absorbed by the amine-based solvent. 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. After CO_2 absorption, the flue gas will move upwards to the water wash component of the Absorber Column. The water wash component will maintain the flue gas water balance, recover chemical vapour and control chemical emissions. The treated flue gas will then be emitted into the atmosphere, via a new stack at the top of the Absorber Column. The flue gas emissions will be continuously monitored.

2.2.16. The Solvent Regeneration System consists of the Regenerator Column and solvent processing. In the Regenerator Column, the CO_2 rich amine-based solvent will be steam-stripped to remove the CO_2, leaving a CO_2 lean amine-based solvent. The steam in the Regenerator Column will be produced by the regenerator reboiler, using low pressure steam supplied from the Riverside 1 and Riverside 2 boilers and steam turbine infrastructure.

2.2.17. The CO_2 lean solvent will reach the solvent processing system in which it is passed through 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 on site.

2.2.18. Small volumes of amine-loaded waste will be produced from the Solvent Regeneration System. It is likely that a storage tank will be required on site, to store this waste prior to being transferred off site to suitable waste treatment facility.

2.2.19. The CO_2 will then be sent for Compression, Conditioning and Liquefaction (Stage 3).

Stage 3 – Compression, Conditioning and Liquefaction

2.2.20. The captured CO_2 must undergo compression, dehydration, oxygen scavenging and liquefaction to meet conditions for onwards ship transport and permanent sequestration underground.

2.2.21. The low pressure, wet CO_2 is first compressed, and water cooled, via intercooling between compression stages. The dehydration unit will consist of a number of adsorber vessels, with a number of vessels on standby or in regeneration. Low pressure steam shall be utilised for adsorber regeneration.

2.2.22. The liquefaction process consists of passing the dry CO_2 stream through a heat exchange system in which it is condensed against evaporating refrigerant (from a separate refrigeration package). A distillation column may be required in order to remove inert components in order that the CO_2 export specification can be met.

2.2.23. The liquid CO_2 (LCO_2) would then be routed to on-site buffer storage, via above ground pipelines.

Stage 4 – Liquid CO_2 Storage

2.2.24. On-site storage is required to store the LCO_2 prior to onwards transport by ship from the Proposed Jetty; consisting of above ground pressure vessels. As the LCO_2 is stored at saturated conditions, a small amount of liquid 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 sent to a vent stack.

Stage 5 – Liquid CO_2 Loading System

2.2.25. The LCO_2 would be pumped from the LCO_2 pressure vessels to the Proposed Jetty (described following the Hydrogen Project) via above ground pipelines and onto marine vessels via a Marine Loading Arm. The LCO_2 would be loaded through one or more manifolds located around the centre of the marine vessels. The loading equipment would be sized so that vessel turnaround time is less than 24 hours.

2.2.26. A vapour return line would route the displaced CO_2 vapour to be combined with the BOG from the storage tanks and sent to be re-liquefied (Stage 3 – Compression, Conditioning and Liquefaction). If there is any BOG that cannot be handled by Stages 3 and 4, it would be vented via a vent stack as mentioned as part of Stage 4 – Liquid CO_2 Storage, however venting of BOG will not be a normal operation.

2.2.27. The development of the destination geological storage locations offshore and the transportation of LCO_2 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 LCO_2 may be assessed as part of the EIA process for the Proposed Scheme, where appropriate.

HYDROGEN PROJECT

Hydrogen Policy Position

2.2.28. The Energy White Paper and Hydrogen Strategy both recognise that in order to decarbonise the energy system fossil fuels must be replaced with clean energy alternatives such as hydrogen; the Prime Minister's Ten Point Plan designates hydrogen as a key priority area. The Government notes that hydrogen is a gas that can be used as a fuel without emitting harmful greenhouse gases and will therefore be" critical *in reducing emissions from heavy industry, as well as in power, heat and transport"* (**Ref 2.16**).

2.2.29. This sentiment is reflected in the draft Energy National Policy Statement (**Ref 2.12**), where it is stated that:

- *"there is an urgent need for all types of low carbon hydrogen infrastructure to allow hydrogen to play its role in the transition to net zero"* (paragraph 3.4.16); and
- *"producing hydrogen through water electrolysis with low carbon power ('green' hydrogen) does not rely on CCS but the government's view is that both are needed to achieve the scale of low carbon hydrogen production required for net zero"* (paragraph 3.5.4).

2.2.30. The Hydrogen Project is proposed to produce hydrogen via electrolysis. The potential plant capacity is up to 50MWe which correlates to 39MW of hydrogen production (21.6 tonnes per day of hydrogen) that will contribute to:

- The UK 5GW target for hydrogen technology, asset out in the Hydrogen Strategy (**Ref 2.17**); and
- The achievement of the Government's goal to develop a UK hydrogen economy and demonstrate global leadership in low carbon hydrogen, pursuant to the Hydrogen Strategy (**Ref 2.17**).

2.2.31. Furthermore, the location of the Proposed Scheme, on the River Thames and within Greater London, means that the Hydrogen Project will perform a role in the decarbonisation of commercial vessels and vehicles travelling in and out of the Capital. A 50MWe electrolyser plant capacity would be sufficient to fuel approximately 675 HGVs per day or a combination of HGVs and marine vessels.

Hydrogen Project

2.2.32. The Hydrogen Project will broadly consist of the following:

- Stage 1 – Electricity Supply
- Stage 2 – Water Treatment
- Stage 3 – Electrolysis Plant
- Stage 4 – Scrubbing, Dehydration, Deoxidising and Purification
- Stage 5 – Hydrogen Storage
- Stage 6 – Hydrogen Export / Use

2.2.33. The stages are shown in **Figure 2-6** and described below. At the end of this section a short description is also provided of the ancillary equipment necessary to facilitate the operation of the Proposed Scheme, including the Hydrogen Project.

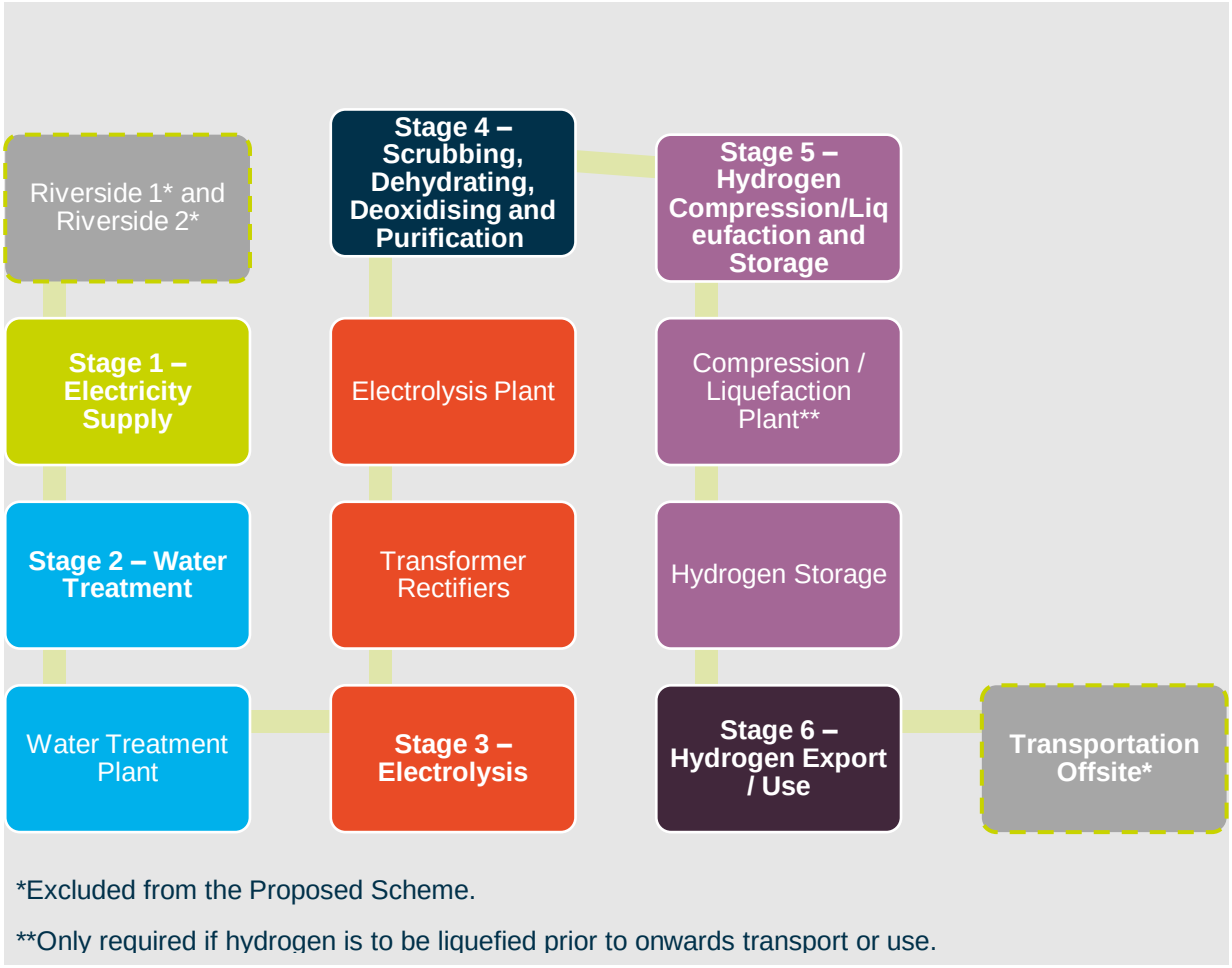

Figure 2-6: Hydrogen Project

Stage 1 – Electricity Supply

2.2.34. Low carbon electricity will be supplied from Riverside 1 and Riverside 2, post installation of carbon capture to remove up to 95% of CO_2 from emitted flue gas.

Stage 2 – Water Treatment

2.2.35. Type II de-ionised water is required for the Electrolysis Plant (Stage 3) and will be produced on site through the water treatment plant. Deionisation uses a multi-stage purification process to remove solids from water using ion exchange, this purification will be undertaken via reverse osmosis or deionisation filters.

2.2.36. The source of the water supply is yet to be determined. The following options are being explored as part of the ongoing design: (i) abstraction from the River Thames, (ii) mains water connection, process effluent from the Carbon Capture and Storage Project, and/or (iii) local supply from neighbouring landowners. This Scoping Report has been prepared taking into account all of these options.

2.2.37. Dependent on the source of the water and resilience of the water source on site, water storage may be required in proximity to the water treatment plant.

Stage 3 – Electrolysis Plant

2.2.38. Hydrogen and oxygen will be produced from the electrolysis of the Type II de-ionised water. This function will be performed by an array of electrolyser stacks, combined to reach a proposed capacity of up to 50MWe. An electrolyser consists of two electrodes (anode and cathode) separated by an electrolyte or membrane, with the electrolyte acting as a medium to transport ions from one electrode to the other. This movement will enable the splitting of the Type II de-ionised water into its constituent parts, allowing the production of both hydrogen and oxygen.

2.2.39. Two options are currently being considered for the electrolyser technology:

- Alkaline – alkaline electrolysers use a liquid electrolyte (typically potassium hydroxide) with a porous separator between the anode and cathode and is the more established and lower cost of the two technologies; or
- Proton exchange membrane – proton exchange membrane electrolysers use a solid polymer electrolyte membrane between the anode and the cathode and provide benefits in operating range and fast response ramp-up and ramp-down capability in comparison to alkaline electrolysers.

2.2.40. Prior to reaching the electrolyser, the low carbon electricity from Stage 1 will pass through transformer rectifiers, located within the same building or container as the electrolyser.

2.2.41. Oxygen, as produced by the electrolyser, will either be vented, or stored and transported off site to supply industries with an oxygen demand, should such a demand be identified.

Stage 4 – Scrubbing, Dehydrating, Deoxidising and Purification

2.2.42. In the case of alkaline electrolysis, the produced hydrogen shall be scrubbed of any residual electrolyte, this is completed in the gas scrubbers. The gas scrubbers additionally cool down the gas, thus supporting the dehydration of the saturated hydrogen. In the case of proton exchange membrane electrolysis, the saturated hydrogen and oxygen gas shall be cooled to dehydrate the respective gases utilising heat exchangers.

2.2.43. Gas purification of both proton exchange membrane and alkaline electrolysis are the same from this point. The cooled gas will be passed through a gas-liquid separator, to remove water droplets, followed by a de-oxo catalyst, to remove any trace oxygen that may have crossed over from electrolysis.

2.2.44. The final purification step is dehydration of the hydrogen through the use of desiccant beds; a desiccant being a substance that absorbs water. The desiccant beds will remove the remaining water, in both droplet and vapour form achieving a fuel-cell grade hydrogen purity (ultrapure). This purity will be suitable irrespective of the onwards use of the hydrogen, as hydrogen fuel cells (utilised in hydrogen fuel cell powered transport modes) require the most onerous purity.

2.2.45. It is anticipated that the electrolysers and hydrogen scrubbing, dehydration, deoxidising and purification will be housed together in a single building, with some selected process plant located external to the building. Dependent on the final scale of the electrolyser plant, there may be more than one building containing electrolyser arrays and associated scrubbing, dehydration, deoxidising and purification plant.

Stage 5 – Hydrogen, Compression/Liquefaction and Storage

2.2.46. Produced hydrogen will be stored within the Site Boundary prior to onwards transport or use. The hydrogen will either be compressed to high pressure or liquefied, to enable a greater storage mass in a smaller footprint on site.

2.2.47. Liquid storage will only be utilised as the storage medium if the onwards transport or use of the hydrogen requires this. In this case, a liquefaction plant will also be required, to liquify the gas.

2.2.48. Hydrogen compression shall consist of multi-stage compressors with inter-stage cooling and will be an oil-free technology, such as ionic compression.

2.2.49. In the case of liquefaction, hydrogen gas will be cooled to approximately -253°C via use of a suitable refrigerant, followed by expansion via valve or expansion turbine.

2.2.50. The compressed gas and/or liquid hydrogen would then be routed to on-site storage via above ground pipeline.

2.2.51. The storage volume will be dictated by the onward transport and use cases of the hydrogen; which is to be determined as part of the ongoing design process and assessed accordingly in the ES.

Stage 6 – Hydrogen Export / Use

2.2.52. There are a number of identified potential demand nodes for the low carbon hydrogen. For supply of hydrogen to the transport sector via new infrastructure located on-site, there is the option to locate new bunkering facilities for marine vessels, as part of the Proposed Jetty.

2.2.53. For the export of hydrogen off site, onwards transport options currently include:

- Connection to a pipeline being brought forward by a distribution network operator – this will involve a network entry facility;
- Hydrogen tube trailers – requiring a road tanker loading facility on-site; or
- Hydrogen tankers (ships) – requiring a hydrogen loading system and bunkering facilities, using the Proposed Jetty.

2.2.54. These aspects are still being considered by the Applicant; as such this Scoping Report has been produced on the basis of consideration of all of the above being required.

2.2.55. The onward transport of the low carbon hydrogen is not part of the Hydrogen Project, although it is acknowledged that the 'downstream' effects of transporting the hydrogen may be assessed as part of the EIA process for the Proposed Scheme, where appropriate.

PROPOSED JETTY

2.2.56. A new and dedicated Proposed Jetty within the River Thames (the Proposed Jetty) is required to export the CO_2. The loading platform would be installed in close proximity to the on-site buffer storage. The Proposed Jetty would include pedestrian access and potentially vehicle access.

2.2.57. A water depth of approximately 9m would be required to provide access at all state of tides. Dredging would be required to provide access to/from the River Thames shipping channel to the Proposed Jetty, including the creation of a berthing pocket for marine vessels. The Proposed Jetty would also include a series of berthing and mooring dolphins around the central loading platform. The mooring layout would be established to accept the range of expected marine vessel sizes.

ANCILLARY INFRASTRUCTURE AND EQUIPMENT

2.2.58. Ancillary infrastructure and equipment likely to be included within the Proposed Scheme are as follows:

- Carbon Capture and Storage Project:
  - Chemical storage and distribution handling facilities – to store and process the amine-based solvent for Stage 2;
  - Back pressure turbine – to provide steam into Stage 3;
  - Access roads and site boundary fencing;
  - Wastewater treatment plant to treat condensate recovered from the new plant;
  - Hybrid cooling system;
  - Instrument air system;
  - Drainage;
  - Equipment room and welfare area;
  - Lighting;
  - Electrical infrastructure, including a new substation and transformers; and
  - Backup power supply (for example a battery energy storage system and/or emergency standby generators).
- Hydrogen Project:
  - Access roads and site boundary fencing;
  - Wastewater treatment plant;
  - Hybrid cooling system;
  - Instrument air and nitrogen (purging gas) system;

- Drainage;
- Equipment room and welfare area;
- Lighting;
- Electrical infrastructure, including a new substation and transformers; and
- Backup power supply (for example a battery energy storage system and/or emergency standby generators).

2.2.59. The use of a battery energy storage system would also provide resilience to the National Grid and support the movement towards zero-carbon electricity.

2.2.60. In addition to the above, there will be consideration of a heat recovery and thermal storage system that will redirect heat produced from the Carbon Capture and Storage processes which would otherwise be wasted energy into the proposed Riverside Heat Network, significantly enhancing its scale and availability.

2.3. CONSTRUCTION

INDICATIVE CONSTRUCTION PROGRAMME

2.3.1. Construction for the Proposed Scheme is expected to start in Q1 2026 with an estimated 60-month construction programme. The Carbon Capture Project will be constructed in either a single phase or two phases, with the first train (capture plant, compression, dehydration, and liquefaction), the Proposed Jetty and the ancillary infrastructure and equipment constructed in the first phase, and second train in the second phase. The approach to construction will be determined as part of the ongoing design process and assessed accordingly in the ES. If optionality remains at ES, each topic chapter will consider the worst-case approach for their topic accordingly.

2.3.2. **Table 2-1** overleaf shows a preliminary construction programme on the basis of a two-phase construction. A more detailed construction programme will be presented for Statutory Consultation.

Table 2-1: Preliminary Construction Programme

	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
Carbon Capture Project																				
Site Preparation and Clearance																				
Groundworks																				
Phase 1																				
Civil Works																				
Installation Works																				
Commissioning																				
Phase 2																				
Civil Works																				
Installation Works																				
Commissioning																				

	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
Hydrogen Project																				
Groundworks																				
Civil Works																				
Installation Works																				
Commissioning																				

TEMPORARY CONSTRUCTION COMPOUNDS

2.3.3. One or more temporary construction compounds will be required. Land will be allocated within the Site Boundary. These areas will be used during construction for construction 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 for further development as part of the Proposed Scheme.

CONSTRUCTION LIGHTING

2.3.4. Temporary lighting will be provided during construction with appropriate controls for the protection of human and ecological receptors.

CONSTRUCTION WORKING HOURS

2.3.5. During construction, it is expected that core working hours 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.

2.3.6. It is likely that some construction activities and deliveries will be required to be 24 hours at certain times. Where work is required outside of core construction hours this will be agreed in advance with LBB.

CONSTRUCTION DELIVERY AND ACCESS

2.3.7. It is assumed that the majority of the transport of construction materials for the Proposed Scheme will be by road. There is the possibility that some deliveries can be via the River Thames, in particular for the construction of the Proposed Jetty. There is the potential for construction materials to be delivered via river on the Thames, particularly steel piles, precast concrete units, marine equipment such as fenders, and the pontoon for the Proposed Jetty. It must be ensured that Middleton Jetty continues to operate as usual to enable the continued operation of Riverside 1 and Riverside 2. The ES will explain the assumptions that are made in this regard and how they are secured, particularly in light of the policy requirements of Transport for London (TfL) and the Port of London Authority (PLA).

CODE OF CONSTRUCTION PRACTICE

2.3.8. 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 construction activities.

2.3.9. A Framework Construction Traffic Management Plan will be prepared as an appendix to the OCoCP.

2.4. OPERATION AND MAINTENANCE

2.4.1. The earliest operational date for the Carbon Capture Project is likely to be Q4 2028. The Hydrogen Project's earliest operational date is likely to be Q4 2028. The Hydrogen Project must be operational after Phase 1 of the Carbon Capture Project, to ensure the produced hydrogen is low carbon as the Electrolysis Plant will be supplied by low carbon electricity. Operation of the Proposed Jetty would align with the two projects of the Proposed Scheme.

OPERATION LIGHTING

2.4.2. Operational lighting arrangements are in place for the Riverside Campus. It is assumed that any new lighting for the Proposed Scheme will comply with these design standards. An Outline Lighting Strategy will be submitted as part of the application for a DCO for the Proposed Scheme.

HOURS OF WORKING

Carbon Capture and Storage Project

2.4.3. The Carbon Capture and Storage Project, and the Proposed Jetty, is expected to be operational 24 hours per day and 365 days per year.

2.4.4. 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 marine vessel number has been calculated on the basis of the marine vessel capacity and the anticipated weekly CO_2 capture rate for both Riverside 1 and Riverside 2 at peak capacity. It is expected that the marine vessels will have a LCO_2 capacity of approximately 7,500m^3 each. 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 referenced above.

Hydrogen Project

2.4.5. The Hydrogen Project is expected to operate when Riverside 1 and Riverside 2 are generating low carbon electricity, requiring the Carbon Capture and Storage Project to also be in operation. The low carbon electricity is required to supply the Electrolysis Plant. As described in **Section 2.2** the method of collection and transportation of hydrogen will be determined as part of the ongoing design process and assessed accordingly in the ES.

MAINTENANCE

2.4.6. Maintenance of the Proposed Scheme would be the responsibility of the Applicant, and would involve routine, planned maintenance and system checks, as well as reactive maintenance and repairs.

SITE STAFF

2.4.7. Staff would be required for operation and maintenance of the Proposed Scheme.

HAZARD PREVENTION AND EMERGENCY PLANNING

2.4.8. The Proposed Scheme will be regulated under the Control of Major Accident and Hazards (COMAH) Regulations 2015 (**Ref 2.19**). Under the COMAH Regulations, the Applicant has a duty to take all measures necessary to prevent Major Accidents and to limit their consequences for human health and the environment. The COMAH management system and its associated documentation will be reviewed and updated accordingly to account for the change in inventory associated with the Proposed Scheme.

2.4.9. The Applicant will be seeking associated permit(s) for the Proposed Scheme, that will include measures relating to hazard prevention and emergency planning.

2.4.10. The approach to the consideration of major accidents and disasters in relation to the EIA for the Proposed Scheme is described in **Chapter 19: Major Accidents and Disasters**.

DECOMMISSIONING

2.4.11. The Proposed Scheme is anticipated to operate for a minimum of 25 years. At the end of the 25-year period, the Proposed Scheme may have some residual life remaining and a decision will be made as to whether to extend the operational life of the Proposed Scheme. The approach to the consideration of decommissioning in relation to the EIA for the Proposed Scheme is described in **Chapter 3: EIA Methodology**.

2.5. REFERENCES

Ref 2.1: Cory Group. (2021). The Journey of Waste Annual Report'. Available at: https://www.corygroup.co.uk/application/files/1216/5642/7711/Cory_AR2021_web.pdf

Ref 2.2: Cory Group. (2017). 'Riverside 2'. Available at: https://www.corygroup.co.uk/future-growth/riverside-energy-park/

Ref 2.3: Cory Group. (2017). 'Riverside Resource Recovery Facility Annual Performance Report: 2017'. Available at: file:///C:/Users/UKDXR043/Downloads/RRR-annual-op-report-2017.pdf

Ref 2.4: The London Borough of Bexley. (2022). 'Sites of Importance for Nature Conservation (SINC) Partial Review Paper. Addendum to the SINC Report 2016'. Available at: https://www.bexley.gov.uk/sites/default/files/2022-05/CD10b-sites-of-importance-for-nature-conservation-addendum-2022.pdf

Ref 2.5: Bexley Wildlife. (2023). 'Wildlife, Conservation and Sustainability in the London Borough of Bexley'. Available at: https://www.bexleywildlife.org/crossness-nature-reserve/

Ref 2.6: London Borough of Bexley. (2016). 'Sites of Importance for Nature Conservation Report'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-10/Sites-of-Importance-for-Nature-Conservation-SINC-Report-2016C.pdf

Red 2.7: DEFRA. (2022). 'Marsh Dykes Operational Catchment'. Available at: https://environment.data.gov.uk/catchment-planning/OperationalCatchment/3298

Ref 2.8: IPCC. (2022). 'IPCC Sixth Assessment Report'. Available at: https://www.ipcc.ch/report/ar6/wg2/

Ref 2.9: Department for Business, Energy & Industrial Strategy. (2020). 'Energy white paper: Powering Out Net Zero Future'. Available at: https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future

Ref 2.10: Department for Business, Energy & Industrial Strategy. (2018). 'Clean Growth Strategy'. Available at: https://www.gov.uk/government/publications/clean-growth-strategy

Ref 2.11: Department for Business, Energy & Industrial Strategy. (2021). 'Industrial Decarbonisation Strategy'. Available at: https://www.gov.uk/government/publications/industrial-decarbonisation-strategy

Ref 2.12: Department for Business, Energy & Industrial Strategy. (2021). 'Draft Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf

Ref 2.13: Department for Business, Energy & Industrial Strategy. (2022). 'British Energy Security Strategy'. Available at: https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy

Ref 2.14: Cory. (2022). 'Cory Decarbonisation Project Section 35 Request'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1109718/cory-decarbonisation-project-section-35-request.pdf

Ref 2.15: Department for Business, Energy & Industrial Strategy. (2021). 'Draft National Policy for Renewable Energy Infrastructure (EN-3)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015236/en-3-draft-for-consultation.pdf

Ref 2.16: Department for Business, Energy & Industrial Strategy. (2020). 'The Ten Point Plan for a Green Industrial Revolution'. Available at: https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution/title

Ref 2.17: Department for Business, Energy & Industrial Strategy. (2021). 'UK Hydrogen Strategy'. Available at: https://www.gov.uk/government/publications/uk-hydrogen-strategy

Ref 2.18: Cory Riverside Energy Park, (2018) 'Environmental Statement Technical Appendices', Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010093/EN010093-000274-6.3%20ES%20Technical%20Appendices%20K.3%20Outline%20Lighting%20Strategy.pdf

Ref 2.19: HM Government. (2015). 'Control of Major Accident Hazard Regulations 2015'. Available at: https://www.legislation.gov.uk/uksi/2015/1393/made

3. EIA METHODOLOGY

3.1. INTRODUCTION

3.1.1. This chapter sets out the overall approach to the EIA for the Proposed Scheme. A detailed overview of the methodology adopted for each environmental topic is provided within the respective chapters of this Report. The approach to the assessment has been informed by current best practice guidance, as set out within PINS Advice Note 7 (**Ref 3.1**).

3.1.2. The ES will contain the information specified in both Regulation 14(2)(a)-(f) and Schedule 4 of the EIA Regulations (**Ref 3.2**).

3.1.3. In line with Regulation 14(4)(a) of the EIA Regulations **(Ref 3.3**), the EIA will be undertaken by a suitably qualified project team and the qualifications and experience of the team will be set out in the ES. The Institute of Environmental Management & Assessment (IEMA) has awarded WSP the EIA Quality Mark (**Ref 3.4**) in recognition of our commitment to excellence in EIA activities. WSP has continued to maintain this following annual examination in relation to our products, staff, innovation, and promotion of EIA within the industry.

3.2. CONSULTATION AND ENGAGEMENT

3.2.1. As part of the EIA, consultation will be undertaken with a range of statutory and non-statutory consultees. It is anticipated at this stage that engagement will be undertaken with the following bodies, in addition to the statutory consultation requirements and the EIA Scoping process:

- ASDA (a neighbouring land interest)
- Aviva
- Crossness LNR
- Environment Agency
- Greater London Archaeology Advisory Service
- Greater London Authority
- Historic England
- Iron Mountain (a neighbouring land interest)
- London Borough of Bexley
- Marine Management Organisation (MMO)
- National Highways
- Natural England
- Peabody
- PLA
- Thames Water
- TfL

3.2.2. The purpose of this engagement will be to brief consultees on the Proposed Scheme, seek feedback on the approach to assessment and obtain baseline data.

3.2.3. Formal non-statutory consultation is expected to take place in Q2 of 2023 and statutory consultation is expected to take place between Q3 and Q4 of 2023. The latter consultation will be supported by a PEIR which will be developed to help consultees take an informed view of the likely significant environmental effects of the Proposed Scheme.

3.2.4. Technical and procedural engagement will continue throughout the EIA process. A summary of the engagement activities with relevant consultees will be included within the ES and technical consultation will be summarised within the individual technical chapters.

3.3. DEFINING THE STUDY AREA

3.3.1. The proposed Study Area for each environmental topic is set out within the respective chapters of this Report (see **Chapters 4-20**).

3.4. ESTABLISHING BASELINE CONDITIONS

3.4.1. Likely significant environmental effects will be described in the ES 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.

3.4.2. Baseline conditions will be established by:

- Site visits and surveys;
- Desk based studies; and
- Modelling.

3.4.3. The baseline conditions for each environmental factor as currently understood are set out within the respective chapters of this Report (see **Chapters 4-20**).

3.4.4. The baseline conditions used in the ES 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 may be used to inform the assessment, if it is deemed to remain relevant.

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

3.4.6. It is assumed for the purpose of this EIA Scoping Report that the baseline conditions at the Site will include the currently operational Riverside 1 at peak capacity (i.e. generating 80.5MW).

LIMITATIONS

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

3.4.8. In order to collect baseline data, it may be necessary to collect data on site. Where it is not possible to access third party private land, data will be collected from publicly accessible land only.

3.5. ESTABLISHING FUTURE BASELINE CONDITIONS

3.5.1. The ES will include an outline of the likely evolution of the existing baseline without implementation of the Proposed Scheme based on available information and knowledge and including precautionary consideration of the effects of climate change. This information will be set out in the description of the Proposed Scheme (which is likely to be Chapter 2 of the ES).

3.5.2. It is assumed for the purpose of this EIA Scoping Report that the future baseline conditions within the Site Boundary will include both Riverside 1 and Riverside 2 as operational facilities at capacity (i.e. generating 80.5MW (Riverside 1) and 76MW (Riverside 2)). At the time of writing this Report construction works for Riverside 2 are being undertaken.

3.5.3. Throughout the EIA process the Applicant will consider developments to be included in the future baseline and developments to be assessed as part of the cumulative effects assessments (see **Chapter 20: Cumulative Effects** for further information).

3.6. CONSIDERATION OF ALTERNATIVES

3.6.1. Regulation 14(2)(d) of the EIA Regulations (**Ref 3.3**) states that an ES should include:

"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"

3.6.2. As part of the iterative design process, the Proposed Scheme will continue to evolve to take account of matters such as environmental constraints and opportunities. This will be recorded within the ES as embedded mitigation (see **Section 3.7**).

3.6.3. As the Proposed Scheme will be new plant in addition to existing infrastructure (Riverside 1 and Riverside 2), alternative locations not located in and around Riverside 1 and Riverside 2 are not considered a viable alternative and will therefore not be appraised within the ES. The assessment of alternatives will focus on alternative technologies, infrastructure locations within the location in and around Riverside 1 and Riverside 2, the construction strategy and best available technology (BAT). The ES will consider the 'do nothing' scenario, i.e. the missed opportunities or avoidance of likely significant environmental effects associated with the Proposed Scheme (both the Carbon Capture and Storage Project and Hydrogen Project).

3.6.4. The main reasons for selecting the chosen options will be provided, including a comparison of environmental effects.

3.7. APPROACH TO MITIGATION

3.7.1. IEMA issued 'Shaping Quality Development' in November 2015 and 'Delivering Quality Development' in July 2016. In accordance with these guidance documents, three types of mitigation will be identified and used within the ES:

- Primary mitigation – modifications to the location or design during the pre-application phase that are an inherent part of the Proposed Scheme. These measures are treated as an inherent part of the Proposed Scheme;
- Secondary mitigation – actions that will require further activity in order to achieve the anticipated outcome. The effectiveness of such measures will be assessed within the ES 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.

3.7.2. The primary and tertiary mitigation will be presented in the Proposed Scheme description in the ES and within the ES chapter relevant to each environmental topic. Primary and tertiary mitigation will be referred to as 'embedded mitigation'. The assessment of the likely significant environmental effects for the pre-mitigation scenario will take embedded mitigation into account in determining the magnitude of change.

3.7.3. Following assessment of the likely significant effects of the Proposed Scheme, any secondary mitigation measures, referred to as 'additional mitigation', will be outlined within the ES chapter relevant to each environmental topic. These mitigation measures will further reduce a negative effect or enhance a positive one. For example, the preparation of a travel plan or landscape planting.

3.7.4. A summary of the embedded design mitigation will be included in the description of the Proposed Scheme chapter of the ES and in the Design Report which will accompany the DCO Application. The additional mitigation will be recorded in a summary chapter of the ES.

3.7.5. In addition, a Register of Commitments 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 this EIA Scoping Report that is relied on to scope out issues from subsequent stages of the EIA. The delivery of these mitigation measures will be secured through requirements in the draft DCO and other suitable mechanisms, as appropriate.

3.7.6. 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.

MONITORING

3.7.7. The EIA Regulations require (**Ref 3.5**), where appropriate, the monitoring of potential significance adverse effects. Where monitoring arrangements are proposed as part of the mitigation set out, this will be detailed within the relevant topic chapter of the ES and detailed within a Register of Commitments (which will indicate in which certified documents the commitments will be secured) and draft DCO (as appropriate). The results of any monitoring will be shared with the relevant organisations, where applicable.

3.8. ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

3.8.1. The ES will report on the likely significant environmental effects for the construction and operational (including maintenance) phases of the Proposed Scheme and will report an estimate, by type and quantity, of expected residues and emissions.

3.8.2. 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. Given that the Applicant has no plans to decommission the Proposed Scheme, further consideration of decommissioning is not considered appropriate.

3.8.3. 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 ES stage. Therefore, the principles of PINS Advice Note 9 (**Ref 3.6**) 'Using the Rochdale Envelope' will be adopted to define the envelopes, parameters, or limits of deviation, within which the construction and operation of the Proposed Scheme would be undertaken. These parameters will be defined within the Application drawings and the draft DCO.

3.8.4. For the purposes of the PEIR a zoning plan for the Carbon Capture and Storage Project, Hydrogen Project, Proposed Jetty and ancillary infrastructure and equipment will be presented. This zoning plan will inform the development of the envelopes, parameters, or limits of deviation, within which the construction and operation of the Proposed Scheme would be undertaken.

3.8.5. 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 ES. The detailed design and construction methodology for the Proposed Scheme will be developed within these parameters

without the need for further assessment (though design approvals will be required to confirm compliance with the assessed envelopes).

3.8.6. 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 (to be defined within the ES);
- Whether the effect is short term, medium term or long term in duration (to be defined within the ES);
- Whether the effect is reversible or irreversible (to be defined within the ES); and
- Inter-relationship between effects (both cumulatively and in terms of potential effect interactions).

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

3.8.8. Where topic-specific guidance requires that specific criteria or scales for determining significance are to be used, this will be outlined in the relevant technical chapter of the ES.

3.8.9. 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 3-1**.

Table 3-1: 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

3.8.10. Where a range is presented within **Table 3-1**, professional judgement will be used to define the significance of effect.

3.8.11. Only Moderate and Major effects are considered to be significant in EIA terms.

3.8.12. Tables to summarise the likely significant effects will be provided within the ES. These tables will outline sensitive receptors, mitigation measures and residual effects. A distinction will be made between direct and indirect; short term, medium term, and long term; permanent and temporary; and positive and negative effects.

3.8.13. The significance criteria of Cumulative Effects will be considered in a separate section as outlined in **Chapter 20: Cumulative Effects**.

3.9. ASSESSMENT OF TRANSBOUNDARY IMPACTS

3.9.1. Regulation 32 of the EIA Regulations (**Ref 3.7**) 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 PINS Advice Note 12 (**Ref 3.8**).

3.9.2. 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 Boundary.

3.10. ASSESSMENT OF HEAT AND RADIATION

3.10.1. Schedule 4 of the EIA Regulations (**Ref 3.2**) requires consideration of the likely significant effects of the Proposed Scheme resulting from the emission of heat, light and radiation. However, no significant sources of such emissions are anticipated and as such it is proposed to scope this topic out of the ES.

3.10.2. The effects of heatwaves, extreme weather and other external hazards will be considered in **Chapter 19: Major Accidents and Disasters**.

3.11. STRUCTURE OF THE ES

3.11.1. At this stage it is anticipated that the ES will be structured as follows:

- Volume 1 – Main Text:
  - Chapter 1 – Introduction
  - Chapter 2 – Description of the Site and Proposed Scheme
  - Chapter 3 – Consideration of Alternatives
  - Chapter 4 – Approach to EIA
  - Chapter 5 – Consultation
  - Chapter 6 – Air Quality
  - Chapter 7 – Noise and Vibration
  - Chapter 8 – Terrestrial Biodiversity
  - Chapter 9 – Marine Biodiversity
  - Chapter 10 – Heritage
  - Chapter 11 – Townscape and Visual Impact
  - Chapter 12 – Water Environment and Flood Risk
  - Chapter 13 – Climate Resilience
  - Chapter 14 – Greenhouse Gases
  - Chapter 15 – Population, Health, and Land Use
  - Chapter 16 – Materials and Waste
  - Chapter 17 – Ground Conditions and Soils
  - Chapter 18 – Landside Transport
  - Chapter 19 – Maritime Navigation
  - Chapter 20 – Major Accidents and Disasters
  - Chapter 21 – Cumulative Effects
  - Chapter 22 – Summary of Likely Significant Effect
- Volume 2 – Appendices
- Volume 3 – Figures

ADDITIONAL DOCUMENTATION

3.11.2. A number of supporting application documents, which will not form part of the ES but which will be relied upon and referred to within the ES, will be submitted as part of the DCO Application. Such documents will be inclusive of but not limited to the ES Non-Technical Summary (NTS), a Register of Commitments and relevant Management Plans.

3.12. COORDINATION OF ASSESSMENTS

3.12.1. There are several other associated assessments that will be undertaken to accompany the DCO Application, as follows:

HABITATS REGULATIONS ASSESSMENT (HRA)

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

3.12.3. Given the sensitivities of the surrounding habitats, and the range of species they can support, works at the site are likely to require assessment of other Important Ecological Features (**Ref 3.9**), considering these a HRA will be prepared. Where determination of likely significant effect (LSE) is identified, a detailed assessment will be provided to assess whether the proposals could result in adverse effects on the integrity of relevant International Sites.

3.12.4. 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. However, the scope presented within this Report has been developed to ensure that the needs of both processes have been considered to ensure a coordinated assessment. A report titled 'Information to Inform a Habitat Regulations Report' is presented will be submitted to Natural England separately.

BIODIVERSITY NET GAIN (BNG) ASSESSMENT

3.12.5. Following industry best practice guidance, the BNG Assessment will analyse the habitats to be retained, enhanced, created, or lost within the Site. It will identify whether habitat compensation is required and will demonstrate benefits resulting from the Proposed Scheme.

WATER FRAMEWORK DIRECTIVE (WFD) SCREENING REPORT

3.12.6. The Water Framework Directive (WFD) Screening Report will consider the potential for both the construction and operational impacts from the Proposed Scheme upon the relevant WFD quality elements, for WFD surface water and groundwater bodies likely to be impacted. This includes identifying likely risks to: biodiversity; the biological, physico-chemical and hydromorphological quality of the WFD surface water bodies and; groundwater quality of the WFD groundwater bodies; and the likely ability of good-practice methods to manage risks associated with pollutants typically experienced during construction and during the operational phase. The WFD Screening Report will determine the need for a full WFD Assessment. The WFD Screening Report is presented in **Appendix A**.

FLOOD RISK ASSESSMENT (FRA)

3.12.7. A FRA will be prepared to support the EIA in accordance with the National Planning Policy Framework (NPPF) (**Ref 3.10**). 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. The FRA will be supported by a hydraulic modelling of the proposed works, if required. The need and scope for hydraulic modelling will be discussed with the EA.

PRELIMINARY NAVIGATIONAL RISK ASSESSMENT (PNRA)

3.12.8. 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.

3.13. ASSUMPTIONS AND LIMITATIONS

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

- The land requirements of the Proposed Scheme within the Site Boundary are yet to be wholly finalised.
- The end storage location for the captured CO_2 which would be exported via ship from the Proposed Scheme is not confirmed. Whilst the development of the proposed storage locations is not part of the Proposed Scheme, it is acknowledged that the associated effects of shipping the captured CO_2 will need to be assessed as part of the ES, as defined in the relevant technical topic chapters of this Scoping Report.
- An onward transport option for the produced hydrogen is not confirmed. Options include via pipeline from a network entry facility, transport via hydrogen tube trailers from a new road tanker loading facility, or transport via ship export from a new loading facility on the River Thames.
- Areas for ecological mitigation and biodiversity net gain are yet to be confirmed.

3.14. REFERENCES

Ref 3.1: National Infrastructure Planning. (2020). 'Advice Note 7 (Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements'. Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-seven-environmental-impact-assessment-process-preliminary-environmental-information-and-environmental-statements/

Ref 3.2: Gov UK. (2017). 'Schedule 4 of the EIA Regulations'. Available at: https://www.legislation.gov.uk/uksi/2017/571/schedule/4/made

Ref 3.3: Gov UK. (2017). 'Regulation 14 of the EIA Regulations '. Available at: https://www.legislation.gov.uk/uksi/2017/572/regulation/14/made

Ref 3.4: IEMA. 'IEAM Quality Mark'. Available at: https://www.iema.net/corporate-programmes/eia-quality-mark

Ref 3.5: UK Gov. (2020). ‘Guidance: Environmental Impact Assessment’. Available at: https://www.gov.uk/guidance/environmental-impact-assessment

Ref 3.6: National Infrastructure Planning. (2018). ‘Advice Note Nine: Rochdale Envelope’. Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-nine-rochdale-envelope/

Ref 3.7: Gov UK. (2017). ‘Regulation 32 of the EIA Regulations 2017’. Available at: https://www.legislation.gov.uk/uksi/2017/572/regulation/32

Ref 3.8: National Infrastructure Planning. (2020). ‘Advice Note Twelve: Transboundary Impacts and Processes’. Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-twelve-transboundary-impacts-and-process/

Ref 3.9: CIEEM. (2019). ‘Guidelines for Ecological Impact Assessment in the UK and Ireland’. Available at: https://cieem.net/wp-content/uploads/2019/02/Combined-EclA-guidelines-2018-compressed.pdf https://cieem.net/wp-content/uploads/2019/02/Combined-EclA-guidelines-2018-compressed.pdf

Ref 3.10: Gov UK. (2021). ‘Policy Paper: National Planning Policy Framework’. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

4. AIR QUALITY

4.1. INTRODUCTION

4.1.1. This chapter considers the impacts of the Proposed Scheme on air quality during construction and operation, and any potential significant effects. It sets out the proposed methodology for the air quality assessment and identifies those impacts that can be scoped out of the assessment. Where necessary further assessment will be presented in the ES.

4.2. POLICY, LEGISLATION AND GUIDANCE

4.2.1. The policy, legislation and guidance relevant to the assessment of the Proposed Scheme is detailed in **Table 4-1**.

Table 4-1: Air Quality – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011 (Ref 4.1)	Sets out the Government's policy for delivery of major energy infrastructure and will be the primary basis for decision making. Paragraph 5.2.6 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, 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 for Energy EN-1 2021 (Ref 4.2)	The Government has published a draft update to the Overarching National Policy Statement for Energy. For air quality the Draft NPS EN-1 is largely the same as in the NPS EN-1 2011.

Policy / Legislation / Guidance	Description
National Planning Policy Framework (NPPF) 2021 (Ref 4.3)	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 55 • 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 development is an acceptable use of land, rather*

Policy / Legislation / Guidance	Description
	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."
The London Plan 2021 (Ref 4.4)	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 SI 1 of the London Plan is the key policy specific to the improvement of air quality within Greater London, which states that: *'"A) Development Plans, through relevant strategic, site-specific and area-based policies, should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality.* *B) To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:* *1) Development proposals should not:* *a) lead to further deterioration of existing poor air quality* *b) create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits* *c) create unacceptable risk of high levels of exposure to poor air quality.* *2) In order to meet the requirements in Part 1, as a minimum:* *a) development proposals must be at least Air Quality Neutral*

Policy / Legislation / Guidance	Description
	b) development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retro-fitted mitigation measures *c) major development proposals must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of B1* *d) development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people should demonstrate that design measures have been used to minimise exposure* *C) Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating:* *1) how proposals have considered ways to maximise benefits to local air quality, and* *2) what measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this.* *D) In order to reduce the impact on air quality during the construction and demolition phase development proposals must demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance.* *E) Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emissions*

Policy / Legislation / Guidance	Description
	cannot be further reduced by on-site measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development."
London Borough of Bexley Core Strategy 2012 (Ref 4.5)	The Core Strategy sets out the Council's long-term vision for development in the borough. It aims to support a strong, sustainable and cohesive community. The following policies of the Core Strategy relate to air quality: • Policy CS01 – Achieving sustainable development; • Policy CS04 – Erith geographic region; • Policy CS09 – Using Bexley's resources sustainability; • Policy CS15 – Achieving an integrated and sustainable transport system; and • Policy CS18 – Biodiversity and geology.
London Borough of Bexley Unitary Development Plan 2004 (Ref 4.6)	The main purpose of the Unitary Development Plan is to provide a framework for guiding development, and to show how land will be used as a resource for achieving the Council's wider objectives. Policy ENV41 relates to air quality: "*The Council will have regard to national and local Air Quality Strategies in seeking to ensure that developments do not compromise air quality objectives. The Council will require an applicant to prepare an Air Quality Assessment where proposals:* *1) Include industrial activities with potentially significant air borne emissions;* *2) Have the potential to increase significantly the volume of traffic flows or the ratio of heavy goods vehicles, or the level of congestion so as to place air quality objectives at risk;* *3) Have the potential to increase the personal exposure of individuals at non-occupational locations to levels of air pollution which are likely to exceed objectives*

Policy / Legislation / Guidance	Description
	set in either national or local Air Quality Strategies; and/or *Are locations (or are likely to effect) an AQMA, which would significantly change the pattern or traffic flows or could lead to emissions of one or more of the pollutants specified in the national Air Quality Strategy."*
London Borough of Bexley Draft Local Plan 2021 (Ref 4.7)	The new Local Plan is awaiting adoption and will then replace the Bexley Core Strategy and Saved UDP policies 2012. It does not contain any specific policies related to air quality, but notes that minimising air pollution is inherent throughout the new Local Plan.
UK Air Quality Strategy (Ref 4.8)	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 ($PM_{2.5}$) – 25µg/m^3 annual mean.
Clean Air Strategy 2019 (Ref 4.9)	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 (Ref 4.10)	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

Policy / Legislation / Guidance	Description
	Particulate Matter) (England) Regulations 2023 (**Ref 4.17**).
London Environment Strategy 2018 (Ref 4.11)	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".*
Legislation	
Environmental Protection Act 1990 – Control of Dust and Particulates Associated with Construction (Ref 4.12)	Section 79 of the Environmental Protection Act 1990 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.
Environment Act 1995, as amended in 2021 (Ref 4.13)	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.

Policy / Legislation / Guidance	Description
Air Quality (England) Regulations 2000 (Ref 4.14)	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 (Ref 4.15)	The Air Quality Standards Regulations were derived from the European Union Ambient Air Quality Directive 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 concentration levels as the relevant AQS objectives and the limit value for $PM_{2.5}$ is a concentration of 25µg/m^3.
Air Quality (Miscellaneous Amendment and Revocation of Retained Direct EU Legislation) (EU Exit) Regulations 2018 (Ref 4.16)	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 (Ref 4.17)	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) (Ref. 4.18)	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.

Policy / Legislation / Guidance	Description
London Local Air Quality Management Technical Guidance (LLAQM.TG(19)) 2019 (Ref 4.19)	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 (Ref 4.20)	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.
EPUK/IAQM Land-use Planning and Development Control: Planning for Air Quality 2017 (Ref 4.21)	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.
IAQM Guidance on the Assessment of Dust from Demolition and Construction 2016 (Ref 4.22)	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 (Ref 4.23)	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 the use of a Low Emission Zone, which was introduced in September 2015.

Policy / Legislation / Guidance	Description
	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.
EA Guidance of Air Emissions Risk Assessment 2021 (Ref 4.24)	This Environment Agency guidance provides details on how to assess emissions for an environmental permit.
London Plan Guidance – Air Quality Positive 2021 (Ref 4.25)	The Air Quality Positive 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 Environmental Statement.

Policy / Legislation / Guidance	Description
London Plan Guidance – Air Quality Neutral 2021 (Ref 4.26)	The Air Quality Neutral Planning Support guidance provides a methodology for assessing the air quality neutrality of proposed developments in London. It involves the calculation of NO_x and PM_{10} emissions for both the transport and buildings sources associated with a proposed development, 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) will be considered to be '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 off site.
Specified Generators: Dispersion Modelling Assessment Guidance 2019 (Ref 4.27)	This Environment Agency guidance provides details on how to model emissions from generators.

4.3. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

4.3.1. The key sources of information on baseline air quality conditions will be:

- London Borough of Bexley Air Quality Reports (**Ref 4.28**);
- London Borough of Barking and Dagenham (LBBD) Air Quality Reports (**Ref 4.29**);
- London Borough of Havering (LBH) Air Quality Reports (**Ref 4.30**);
- London Atmospheric Emissions Inventory (**Ref 4.31**);
- Defra's Air Pollution Background Mapping (**Ref 4.32**);
- Multi Agency Geographic Information System Mapping (MAGIC) (**Ref 4.33**);
- Air Pollution Information System (APIS) (**Ref 4.34**); and
- Google Earth (**Ref 4.35**).

4.3.2. A review of the current air quality conditions has been undertaken. The following borough-wide AQMAs have been identified:

- LBB, declared in 2007 for exceedances of 24-hour mean PM_{10} and annual mean NO_2;

- LBBD, declared in 2008 for exceedances of 24-hour mean PM_{10} and annual mean NO_2; and
- LBH, declared in 2006 for exceedances of 24-hour mean PM_{10} and annual mean NO_2.

4.3.3. In accordance with their duties under the LLAQM.TG(19) and as required under Part IV of the Environment Act 1995, LBB, LBBD and LBH undertake air quality monitoring within their respective jurisdictions. The locations of the continuous analysers used for air quality monitoring are:

- Slade Green (LBB) located approximately 3.9km Southeast of the Proposed Scheme;
- Belvedere Junior School (LBB) located approximately 0.8km south of the Proposed Scheme;
- Bexley Business Academy (LBB) located approximately 1.0km Southwest of the Proposed Scheme;
- A2 at Falconwood (LBB) located approximately 6.6km Southwest of the Proposed Scheme;
- Rush Green Primary School (LBBD) located approximately 6.1km north of the Proposed Scheme;
- Scrattons Farm (LBBD) located approximately 2.7km northwest of the Proposed Scheme; and
- Rainham (LBH) located approximately 3.1km northeast of the Proposed Scheme.

4.3.4. In 2021 there were no monitored exceedances of NO_2, $PM_{2.5}$, PM_{10}, O_3 and SO_2 for annual mean, hourly mean or daily mean AQS objectives at any of the continuous analysers. However, long-term trends in air quality post-covid are uncertain.

4.3.5. LBBD and LBH undertake passive diffusion tube monitoring for annual mean NO_2 in their administrative areas. In 2021 LBBD monitored one exceedance of the objective (Dagenham Heathway), whereas LBH monitored five exceedances (Rush Green Road, Gallows Corner, Butts Green Road, Romford Taxi Rank and Romford Battis).

4.3.6. LBB, LBBD and LBH have declared the following Air Quality Focus Areas (AQFAs):

- LBB – Erith Queens Road Roundabout to Northend Roundabout located approximately 2.6km Southeast of the Proposed Scheme;
- LBB – A2 East Rochester Way/Falconwood located approximately 6.0km Southwest of the Proposed Scheme;
- LBBD – A13 Ripple Road located approximately 2.6km northwest of the Proposed Scheme;
- LBBD – Barking Town Centre located approximately 4.9km northwest of the Proposed Scheme;
- LBBD – Whalebone Lane North located approximately 5.5km northwest of the Proposed Scheme;
- LBH – Rainham Broadway located approximately 2km northeast of the Proposed Scheme; and

- LBH – Romford Town Centre located approximately 6.7km north of the Proposed Scheme.

4.3.7. The AQFAs were defined by the Greater London Authority (GLA) as areas where annual mean NO_2 concentrations exceeded the EU limit (same standards as the air quality objective for annual mean NO_2 in locations where there is high human exposure). The purpose of the AQFAs is to enable targeted measures to reduce NO_2 concentrations. London boroughs are required to have regard to AQFAs when developing an Air Quality Action Plan to address any AQMA declaration.

4.3.8. The information gathered and presented within the ES for Riverside 2 will inform the baseline relevant to air quality, where relevant.

FUTURE BASELINE

4.3.9. 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.

4.3.10. New processes within the Study Area (described in **Section 4.4**) including the operation of Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken), 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.

4.4. STUDY AREA

4.4.1. For the assessment of impacts during construction, the Study Area will be limited to 350m from the Site Boundary and to 50m of routes used by construction vehicles up to 500m from the Site Boundary, as per IAQM Dust Assessment Guidance (**Ref 4.18**).

4.4.2. The operational phase Study Area for air quality extends out to the following distances from the Site Boundary, in line with Environment Agency guidance (**Ref 4.24**):

- 15km for internationally designated ecological sites;
- 10km for human health and nationally designated ecological sites; and
- 2km for locally designated ecological sites.

4.5. SENSITIVE RECEPTORS / RESOURCES

4.5.1. The following sensitive human receptors have been identified within 350m of the Site Boundary:

- Residential properties including:
  - Clydesdale Way (approximately 110m to the south);
  - North Road (approximately 200m to the south);
  - Norman Road (approximately 200m to the south); and
  - Poppy Close (approximately 310m to the south).
- Hospitality facilities including:
  - Travelodge London Belvedere (approximately 90m to the south);
  - Morgan Pub (approximately 90m 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 (approximately 60m to the east);
  - Asda Distribution Centre (approximately 60m to the east); and
  - Lidl Distribution Centre (approximately 260m to the east).
- Users of the PRoW and Crossness LNR (within the Site Boundary).

4.5.2. Given the scale of the 10km Study Area for operational impacts it is not possible or necessary to list all potential human receptors for air quality impacts. However, key human receptors include:

- Gypsy and traveller site, located off Jenningtree Way (approximately 0.5km Southeast);
- 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);
- Harris Academy Rainham (approximately 2.7km to the Southwest);
- 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);
- King George Hospital (approximately 8.5km to the north); and
- Many places of work and residence.

4.5.3. The following internationally designated ecological sites have been identified within 15km of the Site Boundary[2]:

- Epping Forest Special Area of Conservation (approximately 12km to the northwest).

4.5.4. The following nationally designated ecological sites have been identified within 10km of the Site Boundary[3]:

- 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).
- Swanscombe Marine Conservation Zone (MCZ) (approximately 9.2km to the southeast); and
- Ruxley Gravel Pits SSSI (approximately 9.8km to the south).

4.5.5. The following locally designated ecological sites have been identified within 2km of the Site Boundary:

- Crossness LNR (within the Site Boundary);
- 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);
- 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);
- 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);

[2] It should be noted that other SSSIs are found within 10km of the Site Boundary but these are designated for geological features only, possessing no biological features in their citation, and thus they are not in the scope of the assessment.

- 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).

4.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION PHASE

4.6.1. Relevant design, mitigation and enhancement measures will be identified in the ES, these may include:

- no idling of marine vessels;
- production of an Air Quality Dust Management Plan to minimise impacts from dust during construction;
- display the name and contact details of person(s) accountable for air quality and dust issues on the Site Boundary;
- plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible;
- all mobile vehicles associated with the construction should comply with the standards of the London Low Emission Zone (in which the Site is located). For Heavy Goods Vehicles (HGVs), the standard is Euro IV for PM_{10} and $PM_{2.5}$ and for heavier vans and minibuses it is Euro 3;
- vehicles, in particular wheels, should be washed or cleaned before leaving the Site Boundary. Wheel wash facilities should be installed, with the application of rumble grids to dislodge accumulated dust and mud. The route from wheel wash to the public road should be paved; and
- undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results and make the log available to the local authority when asked.

OPERATION PHASE

4.6.2. Relevant design, mitigation and enhancement measures will be identified in the ES, these may include:

- Choosing an appropriate height for the flue for the releasing gas from the Carbon Capture and Storage Project;

- selection of the carbon capture technology vendor to minimise the impact of amine degradation products;
- measures to limit the potential impact of emissions from any new backup power generators by employing state of the art solutions where reasonably practicable to do so;
- no idling of marine vessels;
- implementation of travel plans that are relevant to the intended users of the Proposed Scheme;
- implementation of plans to ensure low or zero emissions from servicing and maintenance activities associated with the Proposed Scheme; and
- additional measures as identified during permit application(s), as appropriate.

4.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

4.7.1. The potential likely significant effects associated with the construction phase will arise from:

- emissions of dust, PM_{10} and $PM_{2.5}$ from construction activities;
- emissions of NO_2, PM_{10} and $PM_{2.5}$ from NRMM; and
- emissions of NO_2, PM_{10} and $PM_{2.5}$ from construction traffic and marine vessels.

OPERATION PHASE

4.7.2. The potential likely significant effects associated with the operation phase will arise from:

- emissions of NO_2, PM_{10} and $PM_{2.5}$ from operational traffic on the public highway associated with the Hydrogen Project;
- impacts associated with the changes arising to the emissions of combustion products from Riverside 1 and Riverside 2 following the application of the Carbon Capture process;
- emissions of amines and aldehydes from the treated flue gas associated with the Carbon Capture and Storage Project;
- emissions of Ozone from the Hydrogen Project;
- emissions of NO_2, PM_{10} and $PM_{2.5}$ from new backup power generators; and
- emissions of NO_2, PM_{10} and $PM_{2.5}$ from additional marine vessel movements.

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

4.7.3. The impacts scoped in or out for air quality are shown overleaf, in **Table 4-2**.

4.7.4. Impacts from any changes arising from the Proposed Scheme to deposition of airborne contaminants has been considered in **Chapter 6: Terrestrial Biodiversity** and **Chapter 7: Marine Biodiversity**.

Table 4-2: Air Quality - Impacts Scoped In or Out of Further Assessment

Impacts	Phase	Scoped In	Scoped Out	Justification
Impacts from dust, PM_{10} and $PM_{2.5}$	Construction	✓		During construction there is the potential to generate dust close to Crossness LNR and residential properties. Potential short-term, temporary, negative impacts on ecological sites, human health and amenity.
Emissions of NO_2, PM_{10} and $PM_{2.5}$ from operation of NRMM (non-road mobile machinery)	Construction	✓		Emissions from NRMM would be limited in accordance with GLA requirements. As operation of NRMM will be limited to working hours and then only when and where required within the Site Boundary, the exhaust emissions are unlikely to have a substantial impact on pollutant concentrations at nearby receptors. A quantitative assessment of this impact may therefore be scoped out in favour of a qualitative assessment following the application of those standard mitigation measures.
Road traffic and marine vessel emissions of NO_2 PM_{10} and $PM_{2.5}$	Construction	✓		The Proposed Scheme would affect road traffic on the local road network which in turn would affect ambient pollutant levels. The use of vessels for construction along the river is also being considered, potentially impacting local air quality. Local air quality at residential properties, offices and school premises could be affected.

Impacts	Phase	Scoped In	Scoped Out	Justification
				Potential negative impacts which could give rise to short-term, temporary, adverse impacts which could give rise to a significant effect.
Road traffic emissions of NO_2 and PM_{10} and $PM_{2.5}$	Operation	✓		The operation of the Carbon Capture and Storage Project is not anticipated to attract any vehicular movements (with the exception of occasional maintenance vehicles) and therefore is not expected to result in significant effects. Therefore, only the operational impact of the Hydrogen Project will be considered (if this transport option is chosen).
Changes to emissions of AQS pollutants and other pollutants, generated in Riverside 1 and Riverside 2 following the application of the Carbon Capture process	Operation	✓		The Carbon Capture and Storage Project will cause changes to the emissions from Riverside 1 and Riverside 2, with potential impact to human health and ecological receptors.
Emissions of new pollutants from Carbon Capture and Storage Project	Operation	✓		The operation of the Carbon Capture and Storage Project will introduce emissions of new pollutants (including amines and aldehydes) that have the potential to affect both human and ecological health, and deposit to surfaces.

Impacts	Phase	Scoped In	Scoped Out	Justification
Emissions of O_3 from the Hydrogen Project	Operation	✓		The operation of the Hydrogen Project will introduce emissions of O_3 that has the potential to affect human health.
Emissions of NO_2, PM_{10} and $PM_{2.5}$ from new backup power generators (ancillary infrastructure and equipment)	Operation	✓		New backup power generators are proposed. The number and locations are yet to be defined, but local air quality at nearby receptors could be affected giving rise to potential long-term, temporary adverse impacts which could lead to a significant effect.
Emissions of NO_2 and PM_{10} and $PM_{2.5}$ from marine vessels	Operation	✓		An assessment of additional vessel emissions associated with the Carbon Capture and Storage Project and Hydrogen Project (if this transport option is chosen) will be undertaken. Local air quality at nearby receptors could be affected with potential long-term, permanent, adverse impacts which could lead to significant effect.
Emissions of toxic/flammable gases from fires	Operation	✓		The gasses that are released from battery energy storage systems are highly flammable and toxic. The type of gas released depends on the battery chemistry involved but typically includes gases such as: carbon monoxide, CO_2, hydrogen, methane, ethane, and other hydrocarbons. Following combustion, emissions could include

Impacts	Phase	Scoped In	Scoped Out	Justification
				particulate matter and other products of incomplete combustion.
Air Quality Neutral Assessment and Air Quality Positive Statement	Operation	✓		London Plan Policy SI 1 'Improving Air Quality' requires that *"development proposals must be at least air quality neutral"*. This policy applies to all developments in Greater London. GLA sets out requirements for developments to demonstrate measures taken to achieve the best possible outcomes for air quality, known as Air Quality Positive.

4.8. PROPOSED ASSESSMENT METHODOLOGY

4.8.1. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with LBB and the EA.

AIR QUALITY SURVEY

4.8.2. An air quality survey will be undertaken for the Proposed Scheme. NO_2 diffusion tubes will be deployed across the Study Area to assist with understanding baseline air quality conditions, as well as aiding model verification. Diffusion tubes will be located at the roadside, along the river front and in some of the nearby ecological sites, with at least one tube located in a background location (where it is not influenced by roadside concentrations).

CONSTRUCTION PHASE: FUGITIVE EMISSIONS OF DUST AND PARTICULATE MATTER

4.8.3. The assessment of construction impacts will be undertaken in line with IAQM guidance on the assessment of dust from demolition and construction (**Ref 4.18**). This guidance provides a risk-based approach to the assessment of the potential for dust effects from four types of activities taking account of the sensitivity of the environment surrounding the works: demolition; earthworks; construction; and track-out (the movement of dust/mud offsite on construction vehicles). The IAQM guidance on the assessment of dust from demolition and construction recommends that the significance of effects is only assessed after mitigation (in this case, the primary mitigation) is taken into account and advises that, in the majority of circumstances, no significant effects are likely. The main purpose of the assessment of dust risk is to ensure that any proposed mitigation is appropriate for the Proposed Scheme.

CONSTRUCTION AND OPERATIONAL PHASE: ROAD TRAFFIC EMISSIONS

4.8.4. Traffic forecasts for peak construction (including the commissioning of train one of the Carbon Capture and Storage Project, the construction of train two of the Carbon Capture and Storage Project and the Hydrogen Project) and Proposed Scheme full opening year scenarios will be screened against indicative criteria for requiring an air quality assessment, as set out in EPUK/IAQM Planning Guidance (**Ref 4.21**).

4.8.5. Where the requirement for inclusion in the air quality assessment is confirmed, the impacts due to changes in road traffic emissions will be assessed using Atmospheric Dispersion Modelling System (ADMS)-Roads dispersion modelling software (**Ref 4.36**) using meteorological data from the representative observing station at London City Airport. As a minimum, the following scenarios will be considered:

- Base year (to account for the absence of Riverside 2 construction activities which will not be present when the Proposed Scheme is constructed);
- Future base year 1;
- Peak construction + future base year 1;
- Future base year 2; and

- Full operational Proposed Scheme + future base year 2.

4.8.6. The ADMS-Roads model for the base year will be verified against local authority and WSP roadside air quality monitoring data in accordance with LLAQM (**Ref 4.19**).

OPERATION PHASE: COMBUSTION PLANT EMISSIONS

4.8.7. An assessment of emissions of pollutants from the following sources will be undertaken using the ADMS 5 dispersion model (**Ref 4.37**) using five years of meteorological data from London City Airport:

- changes to the emissions from Riverside 1 and Riverside 2 as a result of the application of the Carbon Capture process, including new pollutants associated with the Carbon Capture process;
- emissions from the Hydrogen Project;
- emissions from marine vessel movements associated with the Proposed Scheme (both during construction and operation);
- emissions from new backup power generators; and
- emissions from fires.

4.8.8. The dispersion model will be set up with the amine degradation extension to model impacts of amines from the Proposed Scheme. The PEIR and ES will also explain how the Applicant has taken account of EA Guidance (**Ref 4.24 and Ref 4.38**) as it evolves and the latest research in considering the air quality impacts from the amines used as part of the Carbon Capture and Storage Project.

AIR QUALITY NEUTRAL ASSESSMENT AND AIR QUALITY POSITIVE STATEMENT

4.8.9. An assessment of air quality neutrality will be undertaken in accordance with the London Plan 'Air Quality Neutral' guidance (**Ref 4.26**). A separate Air Quality Positive Statement for the Proposed Scheme will be submitted to the GLA in accordance with the London Plan 2021 (**Ref 4.25**). The statement will be an appendix to the ES.

SIGNIFICANCE OF EFFECT CRITERIA

4.8.10. The Mayor of London's SPG (**Ref 4.21**) regarding control of demolition and construction emissions is based on IAQM guidance on the assessment of dust from demolition and construction (**Ref 4.22**) which "*recommends that significance is only assigned to the effect after considering the construction activity with mitigation*." The purpose of the assessment is to determine the levels of risk posed in terms of loss of amenity due to dust soiling and to human health from PM_{10} emissions so that an appropriate level of mitigation can be assigned. As the purpose of the mitigation is to prevent a significant effect, the normal finding is that the residual effect is 'not significant'.

4.8.11. For the operation phase, the significance of potential effects on human health will be broadly consistent with the approach identified **Chapter 3: EIA Methodology**, with impacts at individual receptors described using the matrix set out in EPUK/IAQM

Planning Guidance (**Ref 4.21**) that describes impacts as negligible, slight, moderate or substantial adverse/beneficial as appropriate. The guidance provides a framework, but no specific criteria, to inform the assessment of the significance of effects using professional judgement.

4.8.12. The results of the air quality modelling of impacts on ecological receptors will be passed to the project ecologists for an assessment of significance of effects.

4.9. ASSESSMENT LIMITATIONS AND ASSUMPTIONS

4.9.1. The following limitations and assumptions have been identified:

- The above scope of work is subject to consultation with the Environmental Health Officer of LBB and the EA;
- In preparing the scope it is assumed that appropriate construction information, emissions data and traffic data will be provided for the assessment; and
- The assessment will be based on dispersion modelling that has inherent uncertainties, both within its input data and the formulation of complex atmospheric processes. However, for this Proposed Scheme, modelling is the most appropriate method of determination of impacts against short-term (15 minute / hourly / 8 hourly / daily mean) and annual mean criteria.

4.10. REFERENCES

Ref 4.1: Department of Energy and Climate Change. (2011). 'Overarching National Policy Statement for Energy (EN-1)'. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 4.2: Department of Energy and Climate Change. (2021). 'Draft Overarching National Policy Statement for Energy (EN-1)'. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 4.3: Ministry of Housing, Communities and Local Government. (2021). 'National Planning Policy Framework'. https://www.gov.uk/government/publications/national-planning-policy-framework--2

Ref 4.4: Greater London Authority. (2021). 'The London Plan'. https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

Ref 4.5: London Borough of Bexley (2012). 'Bexley Core Strategy'. https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Core-Strategy.pdf

Ref 4.6: London Borough of Bexley. (2004). 'Unitary Development Plan'. https://www.bexley.gov.uk/sites/default/files/2021-12/Bexley-unitary-development-plan-written-statement-2004.pdf

Ref 4.7: London Borough of Bexley. (2021). 'Draft Local Plan 2021'. https://www.bexley.gov.uk/sites/default/files/2021-10/Draft-local-plan-proposed-submission-document-reg-19-may-2021.pdf

Ref 4.8: Defra. (2007). 'The Air Quality Strategy for England, Scotland, Wales and Northern Ireland'. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69336/pb12654-air-quality-strategy-vol1-070712.pdf

Ref 4.9: Defra. (2019). 'Clean Air Strategy'. https://www.gov.uk/government/publications/clean-air-strategy-2019

Ref 4.10: Defra. (2023). 'Environmental Improvement Plan 2023'. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1133967/environmental-improvement-plan-2023.pdf

Ref 4.11: Greater London Authority. (2018). 'London Environment Strategy'. https://www.london.gov.uk/sites/default/files/london_environment_strategy_0.pdf

Ref 4.12: UK Government. (1990). Environmental Protection Act. https://www.legislation.gov.uk/ukpga/1990/43/contents

Ref 4.13: UK Government. (2021). Environment Act. https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

Ref 4.14: UK Government. (2000). 'The Air Quality (England) Regulations'. https://www.legislation.gov.uk/uksi/2000/928/contents/made

Ref 4.15: UK Government. (2010). The Air Quality Standards Regulations. https://www.legislation.gov.uk/uksi/2010/1001/contents/made

Ref 4.16: Defra. (2020). 'The Environmental (Miscellaneous Amendments) (EU Exit) Regulations'. https://www.gov.uk/eu-withdrawal-act-2018-statutory-instruments/the-environment-miscellaneous-amendments-eu-exit-regulations-2020#:~:text=2018%20statutory%20instruments-,The%20Environment%20(Miscellaneous%20Amendments)%20(EU%20Exit)%20Regulations%202020,directly%20applicable%20retained%20EU%20law

Ref 4.17: UK Government. (2022). 'The Environmental Targets (Fine Particulate Matter) (England) Regulations 2022'. https://www.legislation.gov.uk/ukdsi/2022/9780348242959#:~:text=Regulation%204%20sets%20the%20target,metre%20by%2031st%20December%202040.

Ref 4.18: Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government. (2021). 'National Planning Practice Guidance, Healthy and Safe Communities'. Available at: https://www.gov.uk/guidance/health-and-wellbeing

Ref 4.19: Greater London Authority. (2019). 'London Local Air Quality Management – Technical Guidance'. Available at: https://www.london.gov.uk/sites/default/files/llaqm_technical_guidance_2019.pdf

Ref 4.20: London Air Pollution Planning and the Local Environment. (2007). 'London Councils Air Quality and Planning Guidance'. https://www.londoncouncils.gov.uk/our-key-themes/environment/air-quality/london-councils-air-quality-and-planning-guidance

Ref 4.21: Environmental Protection UK and Institute of Air Quality Management. (2017). 'Land Use Planning & Development Control: Planning for Air Quality'. https://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

Ref 4.22: Institute of Air Quality Management. (2016). 'Guidance on the Assessment of Dust from Demolition and Construction'. https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf

Ref 4.23: Greater London Authority. (2011). 'The Control of Dust and Emissions during Construction and Demolition'. https://www.london.gov.uk/programmes-strategies/planning/implementing-london-plan/london-plan-guidance-and-spgs/control-dust-and

Ref 4.24: Environment Agency. (2021). 'Air emissions risk assessment for your environmental permit'. https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

Ref 4.25: Greater London Authority. (2021). 'Air Quality Positive'. https://www.london.gov.uk/sites/default/files/air_quality_positive_lpg_-_consultation_draft_0.pdf

Ref 4.26: Greater London Authority. (2021). 'Air Quality Neutral'. https://www.london.gov.uk/sites/default/files/air_quality_neutral_lpg_-_consultation_draft_0.pdf

Ref 4.27: Environment Agency. (2019). 'Specified generators: dispersion modelling assessment'. https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment

Ref 4.28: London Borough of Bexley. (2022). 'Annual Status Report for air quality in Bexley during 2021'. https://www.bexley.gov.uk/sites/default/files/2023-02/bexley-air-quality-annual-status-report-2021.pdf https://www.london.gov.uk/sites/default/files/bexley_air_quality_for_public_health_professionals.pdf

Ref 4.29: London Borough of Barking and Dagenham. (2022). 'Annual Status Report for 2021'. https://www.lbbd.gov.uk/sites/default/files/2022-10/Air%20Quality%20annual%20status%20report%202021.pdf

Ref 4.30: London Borough of Havering. (2022). 'Annual Status Report for 2021'. https://www.havering.gov.uk/downloads/download/507/air_quality_reports

Ref 4.31: Greater London Authority. (2019). 'London Atmospheric Emissions Inventory'. https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2019

Ref 4.32: Defra. (2020). 'Background Mapping data for local authorities'. https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

Ref 4.33: Natural England. (2022). ‘Multi Agency Geographic Information System Mapping (MAGIC)’. https://magic.defra.gov.uk/home.htm

Ref 4.34: Centre of Ecology and Hydrology. (2023). ‘Air Pollution Information System’. https://www.apis.ac.uk/

Ref 4.35: Google. (2023). Google Earth Pro. https://earth.google.com/web/

Ref 4.36: Cambridge Environmental Research Consultants Ltd. ‘ADMS-Roads dispersion model’. http://www.cerc.co.uk/environmental-software/ADMS-Roads-model.html

Ref 4.37: Cambridge Environmental Research Consultants Ltd. ‘ADMS dispersion model’. http://cerc.co.uk/environmental-software/ADMS-model.html

5. NOISE AND VIBRATION

5.1. INTRODUCTION

5.1.1. This chapter considers the impacts of the Proposed Scheme on noise and vibration during construction and operation, and any potential significant effects. It sets out the proposed methodology for the noise and vibration assessment and identifies those impacts that can be scoped out of the assessment. Where necessary further assessment will be presented in the ES.

5.2. POLICY, LEGISLATION, AND GUIDANCE

5.2.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is detailed in **Table 5-1**.

Table 5-1: Noise and Vibration – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011 (Ref 5.1)	Sets out the Government's policy for delivery of major energy infrastructure and will be the primary basis for decision making. Section 5.11 Noise and Vibration includes reference to the NPSE and mirrors its requirements, and also provides guidance on what information should be included in a noise assessment for a proposed development.
Draft Overarching National Policy Statement for Energy EN-1 2021 (Ref 5.2)	The Government has published a draft update to the Overarching National Policy Statement for Energy. For noise and vibration, the 2021 Draft NPS EN-1 is largely the same as in the 2011 document.
National Planning Policy Framework (NPPF) 2021 (Ref 5.3)	Presents the Government's planning policies for England and how these are expected to be applied. Noise is referenced within the document as follows:

Policy / Legislation / Guidance	Description
	"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 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:* *a) 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 life65; and* *b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.…"*

Policy / Legislation / Guidance	Description
	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 (Ref 5.4)	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 Noise 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:* *1) avoiding significant adverse noise impacts on health and quality of life* *2) reflecting the Agent of Change principle as set out in Policy D13 Agent of Change* *3) 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*

Policy / Legislation / Guidance	Description
	placing unreasonable restrictions on existing noise-generating uses *4) improving and enhancing the acoustic environment and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity)* *5) 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* *6) 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* *7) promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver".*
London Borough of Bexley Core Strategy 2012 (Ref 5.5)	The Core Strategy sets out the Council's long-term vision for development in the borough. It aims to support a strong, sustainable and cohesive community. Policy CS01 relates to noise and vibration, and states *Achieving sustainable development* includes a reference to noise and requires that "*sustainable development will be achieved*" by "*addressing pollution issues, such as contamination, noise and air quality, to contribute to the health*

Policy / Legislation / Guidance	Description
	and wellbeing of the community and the environment".
London Borough of Bexley Unitary Development Plan (UDP) 2004 (Ref 5.6)	The main purpose of the Unitary Development Plan is to provide a framework for guiding development, and to show how land will be used as a resource for achieving the Council's wider objectives. Policy ENV39 includes reference to noise. It states "*In order to protect and enhance the quality of the built environment, the Council will seek to ensure that all new developments, including alterations and extensions, changes of use and other operations, including highway improvements, are satisfactorily located and are of a high standard of design and layout. In determining applications for development, the Council will consider the extent to which the proposal: has any unreasonable effect on the surrounding area by reason of noise and any emissions to land, air, or water, and is not, by reason of its location, itself adversely affected by such conditions as may already be in existence within the neighbourhood*".
London Borough of Bexley Draft Local Plan 2021 (Ref 5.7)	The new Local Plan is awaiting adoption and will then replace the Bexley Core Strategy and Saved UDP policies 2012. Policy DP11 *Achieving high-quality design* sets out that "*all proposed development and uses do not unacceptably affect residents or occupiers of either the proposed development or of existing neighbouring residents, businesses and community facilities by means of noise, odour,*

Policy / Legislation / Guidance	Description
	vibration and light spill or other disturbance".
Noise Policy Statement for England (NPSE) 2010 (Ref 5.8)	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.
London Environment Strategy 2018 (Ref 5.9)	Published by the Mayor of London in May 2018 with the aim 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*".
Legislation	
Control of Pollution Act 1974 (Ref 5.10)	Introduced to cover a wide range of environmental pollution including construction noise, including the obtaining of section 61 consents in relation to construction noise impacts.
Environmental Protection Act 1990 (Ref 5.11)	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.
Guidance	
National Planning Practice Guidance (2021) (Ref. 5.12)	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

Policy / Legislation / Guidance	Description
	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.
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) (Ref 5.13)	BS 5228 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 (Ref 5.14)	BS 4142 provides an assessment method for noise arising from commercial noise sources, including external plant and on-site vehicle movements and unloading, at residential receptors.
Calculation of Road Traffic Noise (CRTN) 1988 (Ref 5.15)	This technical memorandum describes the procedures for measuring and calculating noise from road traffic. It will be used to calculate the change in noise level because of construction and development generated road traffic.
Highways England, Transport Scotland, Welsh Government and the Department for Infrastructure (Northern Ireland) Design Manual for Roads and Bridges (DMRB). Sustainability & Environment Appraisal. LA 111 Noise and Vibration 2020 (Ref 5.16)	The document 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 will be used to assess the magnitude of impact of any change in noise level because of construction and development generated road traffic.

Policy / Legislation / Guidance	Description
ISO 9613: Acoustics - Attenuation of Sound During Propagation Outdoors - Part 2: General Method of Calculation 1996 (Ref 5.17)	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.

5.3. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

5.3.1. Defra has prepared strategic noise maps in the vicinity of most major roads including the A2016 Eastern Way; this provides an initial appreciation of existing noise levels within and surrounding the Site Boundary. The noise maps are a product of the strategic national noise mapping exercise undertaken by Defra in 2017 (Round 3) to meet the requirements of the Environmental Noise Directive (Directive 2002/49/EC) and the Environmental Noise (England) Regulations 2006 (as amended). Noise maps are shown for two noise level indicators relevant to this assessment:

- $L_{Aeq,16h}$ - the annual average noise level (in dB) for the 16-hour period between 0700-2300; and
- L_{night} - the night-time annual average noise level (in dB) where night is defined as 2300-0700.

5.3.2. **Figure 5-1** presents the Defra noise map for the daytime noise level data within the Site Boundary and surrounding area, and **Figure 5-2** presents the night-time noise level data. The strategic noise mapping does not include industrial sources, which are likely to influence the noise climate across the Site Boundary at this location.

N

Halfway Reach

River Thames

Rainham Creek

Thamesmead

Lower Belvedere

Erith Reach

Education Facility

Education Facility

Education Facility

Education Facility

Belvedere

0 50 100 200 300 400 500

Metres

Key

Site Boundary

Daytime Noise Contours ($L_{Aeq,16h}$)

- ≥75.0
- 70.0 - 74.9
- 65.0 - 69.9
- 60.0 - 64.9
- 55.0 - 59.9

P01	YH	SW	SW	29/03/2023
FIRST DRAFT ISSUE				
REVISION	DRAWN	CHECKED	APPROVED	DATE
DESCRIPTION				

PROJECT TITLE:

CORY DECARBONISATION PROJECT

DRAWING TITLE:

FIGURE 5-1:
DEFRA DAYTIME NOISE MAP

CONFIDENTIALITY

PUBLIC

DRAWN:	CHECKED:	APPROVED:	AUTHORISED:
YH	SW	SW	SW
SCALE @ A3 SIZE:		**DATE:**	**REVISION:**
1:10,620		29/03/2023	P01

DRAWING NUMBER:

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N

Halfway Reach

River Thames

Rainham Creek

Thamesmead

Lower Belvedere

Erith Reach

Education Facility

Education Facility

Education Facility

Education Facility

Belvedere

0 50 100 200 300 400 500

Metres

Key

Site Boundary

Night-time Noise Contours ($L_{Aeq,8h}$)

- ≥70.0
- 65.0 - 69.9
- 60.0 - 64.9
- 55.0 - 59.9
- 50.0 - 54.9

REVISION	DRAWN	CHECKED	APPROVED	DATE
P01	YH	SW	SW	29/03/2023
DESCRIPTION				
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PROJECT TITLE:

CORY DECARBONISATION PROJECT

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FIGURE 5-2:
DEFRA NIGHT-TIME NOISE MAP

CONFIDENTIALITY

PUBLIC

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5.3.3. The existing noise climate on and surrounding the Site Boundary will also be quantified in more detail by undertaking a noise survey as part of the proposed assessment methodology. Further details on the noise survey are provided in **Section 5.8**.

5.3.4. The information gathered and presented within the ES for Riverside 2 will inform the baseline relevant to noise and vibration, where relevant.

FUTURE BASELINE

5.3.5. The future baseline noise climate at the nearest sensitive receptors may be influenced by changes in road traffic noise, and/or due to the industrial and commercial uses in the area.

5.3.6. A significant change in road traffic noise would arise only as a result of a substantial increase in vehicle flow; for example, a 3 dB noise increase would require a 100% increase in road traffic flow, all else remaining equal. A review of the future traffic data will be undertaken at the PEIR stage to quantify any expected change to the future road traffic noise baseline.

5.3.7. The impact of Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken) on the future baseline noise climate has also been considered. The ES for Riverside 2 concluded that there would be no significant adverse noise at the nearest receptors, both as a result of any development-generated traffic and also as a result of the operation of Riverside 2. 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.

5.4. STUDY AREA

5.4.1. The Study Area for the on-site construction noise assessment is a 300m radius from the Site Boundary, and for the construction vibration assessment it is 100m from the Site Boundary. The Study Area for the construction road traffic noise assessment is a 600m radius from the Site Boundary. It is anticipated that noise and vibration as a result of the construction of the Proposed Scheme would be not significant beyond these Study Areas. This is based on professional experience.

5.4.2. The Study Area for the operational noise assessment is a 600m radius from the Site Boundary. It is anticipated that noise as a result of the Proposed Scheme would be not significant beyond this point. This is based on professional experience; however, this will be reviewed, and extended as appropriate, as part of the assessment.

5.5. SENSITIVE RECEPTORS / RESOURCES

5.5.1. The following sensitive receptors have been identified and will be considered within the noise and vibration impact assessment:

- Residential properties including:
  - Clydesdale Way (approximately 110m southeast from the Site Boundary);

  - North Road (approximately 200m southeast from the Site Boundary);
  - Norman Road (approximately 200m south from the Site Boundary);
  - Poppy Road (approximately 200m southeast from the Site Boundary);
  - Little Brights Road (approximately 210m southeast from the Site Boundary); and
  - Gypsy and traveller site, located off Jenningtree Way (approximately 500m southeast from the Site Boundary).
- Hospitality facilities including:
  - Travelodge London Belvedere (approximately 90m southeast from the Site Boundary).

5.5.2. Places of work, including the Riverside Campus, are not considered to be noise sensitive given uses.

5.5.3. The assessment of noise and vibration impacts on ecological receptors will be presented in **Chapter 6: Terrestrial Biodiversity**, **Chapter 7: Marine Biodiversity** and **Chapter 8: Heritage**.

5.5.4. Consideration will be given to other appropriate receptors as more information on the Proposed Scheme becomes available.

5.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION PHASE

5.6.1. Relevant design, mitigation and enhancement measures will be identified in the ES. These may include the adoption of Best Practicable Means, examples of which include:

- noisy works only being undertaken within agreed core construction working hours, which are expected to be Monday to Friday 07:00 – 19:00, Saturday 07:00 – 13:00, with no works on Sunday or bank holidays;
- display the name and contact details for nominated site contact for the public on the Site Boundary to deal with complaints and engaging with local residents;
- selection of quiet and low noise equipment;
- operating an arrive ‘just in time’ policy for construction vehicles to avoid idling on the local road network;
- optimal location of acoustic screening to minimise adverse noise;
- optimal location of equipment on site to minimise noise disturbance; and
- the provision of acoustic enclosures around static plant, where necessary.

5.6.2. Mitigation for terrestrial biodiversity receptors is presented in **Chapter 6: Terrestrial Biodiversity**, for marine receptors in **Chapter 7: Marine Biodiversity** and for heritage receptors in **Chapter 8: Heritage**.

OPERATION PHASE

5.6.3. Relevant design, mitigation and enhancement measures will be identified in the ES. These may include:

- selection of alternative quieter components/plant likely to contribute to significant adverse noise;
- acoustic enclosures or silencers for plant likely to contribute to significant adverse noise;
- acoustic screening in the form of noise barrier or earth-bund, where the line of sight between source and noise sensitive receptor can be broken; and
- if feasible, appropriate seasonal scheduling to minimise potential significant adverse effects on ecological receptors.

5.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT ADVERSE EFFECTS

CONSTRUCTION PHASE

5.7.1. The potential likely significant effects associated with the construction phase include:

- noise and vibration from the construction activities associated with the Proposed Jetty, including any associated dredging;
- noise from construction traffic using the surrounding road network; and
- noise and vibration from construction of the Proposed Scheme.

OPERATION PHASE

5.7.2. The potential likely significant effects associated with the operation phase include:

- Noise associated with the operation of the Carbon Capture and Storage Project of the Proposed Scheme, principally from the following plant:
  - back pressure turbine;
  - wastewater treatment plant to treat condensate recovered from the new plant;
  - cooling system;
  - instrument air system;
  - electrical infrastructure, including a new substation and transformers;
  - a battery energy storage system and/or emergency standby generators; and
  - marine vessel movements and loading.
- Noise associated with the operation of the Hydrogen Project, principally from the following plant:
  - wastewater treatment plant;
  - cooling system;
  - instrument air and nitrogen (purging gas) system;
  - electrical infrastructure, including a new substation and transformers;

- a battery energy storage system and/or emergency standby generators;
- marine vessel movements and loading; and
- export of hydrogen offsite including hydrogen tube trailers and/or tankers.

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

5.7.3. The impacts scoped in or out for noise and vibration are as follows:

Table 5-2: Noise and Vibration - Impacts Scoped In or Out of Further Assessment

Impacts	Phase	Scoped In	Scoped Out	Justification
Noise impacts arising during the construction phase of the Proposed Scheme	Construction	✓		Noise generated during the on-site construction phase has the potential to adversely affect nearby sensitive receptors.
Vibration impacts arising during the construction phase of the Proposed Scheme	Construction		✓	There are no human sensitive receptors closer than 100m from the Site Boundary. At this distance, vibration from construction works is expected to be negligible.
Underwater noise impacts arising during the construction phase of the Proposed Scheme on marine receptors (i.e. marine mammals, hearing specialist fish species)	Construction	✓		Underwater noise generated during the construction phase, particularly piling into the river, has the potential to adversely affect nearby sensitive marine receptors. The scope of assessment of the potential underwater noise impact on marine receptors is presented in **Chapter 7: Marine Biodiversity**.
Noise impacts arising from construction vehicles on the surrounding road network	Construction	✓		Construction vehicle movements associated with the Proposed Scheme along the existing road network may adversely affect nearby sensitive receptors.

Impacts	Phase	Scoped In	Scoped Out	Justification
Vibration impacts arising from construction vehicles on the surrounding road network	Construction		✓	Minimal vibration is generated by construction vehicles (including heavy good vehicles (HGVs)); the separation distance between receptors and road is such that vibration from construction vehicles is expected to be negligible.
Noise impacts arising from the operation of the Proposed Scheme (landside only)	Operation	✓		The operation of the Proposed Scheme has the potential to adversely affect nearby sensitive receptors.
Vibration impacts arising from the operation of the Proposed Scheme	Operation		✓	There are no human sensitive receptors closer than 100m from any proposed potential sources of vibration. At this distance, vibration from operational activity works is expected to be negligible.
Noise impacts arising from additional traffic as a result of the operation of the Proposed Scheme	Operation	✓		The operation of the Carbon Capture and Storage Project is not anticipated to attract any vehicular movements (with the exception of occasional maintenance vehicles) and therefore is not expected to result in significant effects. Therefore, only the operational impact of the Hydrogen Project will be considered (if this transport option is chosen).

Impacts	Phase	Scoped In	Scoped Out	Justification
Vibration impacts arising from additional traffic as a result of the operation of the Proposed Scheme	Operation		✓	Minimal vibration is generated by operational vehicles, including heavy duty vehicles; the separation distance between receptors and road is such that vibration from development related traffic is expected to be negligible.
Underwater noise impacts arising from additional vessel movements on marine receptors (i.e. marine mammals, hearing specialist fish species)	Operation		✓	It is expected that up to five vessels will call at the Proposed Jetty each week to collect and transport liquid CO_2 for the CCS, and three vessels per week for exports from the Hydrogen Project (if this onward transport option is chosen). Any vessels refuelling from the Hydrogen Project will be existing vessels using the River Thames, and therefore ship refuelling will not result in additional movements. Based on the information presented in **Chapter 18: Marine Navigation**, there are already numerous vessel movements within this stretch of water. Consequently, the proposed additional movements from the Proposed Scheme holistically are not anticipated to result in any significant adverse effects on marine receptors.

Impacts	Phase	Scoped In	Scoped Out	Justification
Underwater noise impacts arising from maintenance dredging on marine receptors (i.e. marine mammals, hearing specialist fish species)	Operation	✓		The Proposed Scheme will require maintenance dredging, which may result in an impact on marine receptors.

5.8. PROPOSED ASSESSMENT METHODOLOGY

5.8.1. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with LBB and the EA.

5.8.2. The monitoring locations for the noise survey are shown on **Figure 5-3** with more details below.

- Monitoring location 1 – selected to establish the existing noise levels representative of the nearest noise sensitive receptors to the southeast;
- Monitoring location 2 – selected to establish the existing noise levels close to A2016 Eastern Way;
- Monitoring location 3 – selected to establish the existing noise levels to the west of the Site Boundary to help inform the ecology assessment; and
- Monitoring location 4 – selected to establish the existing noise levels to the north of the Site Boundary to help inform the ecology assessment.

5.8.3. Influence from the construction works at Riverside 2 has been minimised by undertaking measurements over the weekend as well as during the week. Where possible, the noise survey results will be supplemented by the data which was obtained for the Riverside 2 DCO application.

N

Halfway Reach

River Thames

Rainham Creek

Thamesmead

Lower Belvedere

Erith Reach

Belvedere

Education Facility

Education Facility

Education Facility

Education Facility

4

3

2

1

0 50 100 200 300 400 500

Metres

Key

- Site Boundary
- Indicative Noise Monitoring Locations

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FIGURE 5-3:
INDICATIVE NOISE MONITORING PLAN

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CONSTRUCTION PHASE

Construction Noise - Landside

5.8.4. An assessment of temporary construction noise impacts will be 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 (**Ref 5.8**):

- 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.

5.8.5. The scope and level of detail of the assessment undertaken will be proportionate to the risk of a potential likely significant adverse effect occurring.

5.8.6. The baseline noise environment for the construction assessment will be quantified using data from the noise survey described above.

5.8.7. Construction noise levels at the façade of the nearest sensitive receptors to each area of works will be predicted based on the likely plant items (type, quantity and location), construction activities and proposed construction programme. A degree of professional judgement will be required to pragmatically group sensitive receptors and activities where appropriate.

5.8.8. The magnitude and significance of effects for construction noise will be 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.

5.8.9. The LOAEL for each time period (day, evening/ weekends and night) will be set as the baseline noise level for each receptor or group of receptors. The SOAEL will be set as the threshold level determined using section E.3.2 and Table E.1 of BS 5228-1 (the ABC method), which is replicated in **Table 5-3** (**Ref 5.7**).

Table 5-3: 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.			

5.8.10. The magnitude of impact of construction noise shall be determined using the LOAEL and SOAEL values defined in **paragraph 5.8.6** in accordance with the thresholds defined in **Table 5-4**.

Table 5-4: Magnitude of Impact and Construction Noise Descriptions

Magnitude of impact	Construction noise level
Major	Above or equal to SOAEL +5 dB
Moderate	Above or equal to SOAEL and below SOAEL +5 dB
Minor	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL

5.8.11. 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.

Construction Noise – Marine Receptors

5.8.12. An underwater acoustic assessment may be required, and this will be determined at the PEIR stage once more detailed information about the Proposed Scheme is available. A qualitative screening exercise will be undertaken, based on the likely construction methodology within the river, to determine whether the resultant noise levels are predicted to exceed the tolerant thresholds for marine species and if so, to determine the scope of any further required assessments.

Construction Road Traffic Noise

5.8.13. An assessment of noise impacts arising as a result of construction vehicles on the surrounding road network will be undertaken based on the principles of LA 111 (**Ref 5.12**). All road traffic noise predictions will be undertaken based on the principles of the calculation methodology presented in the CRTN (**Ref 5.11**) and LA 111 (**Ref 5.12**).

5.8.14. An assessment of the potential magnitude of impacts and associated significance of effects will be undertaken of the predicted noise level changes, using guidance presented in LA 111 (**Ref 5.12**). The short-term magnitude of impact scales as defined in LA 111 (**Ref 5.12**) are presented in the following table. The long-term magnitude of impact scales as defined in LA 111 (**Ref 5.12**) are also presented as, whilst these will not be needed for the construction road traffic noise assessment, they are likely to be appropriate for the operational road traffic noise assessment.

Table 5-5: Magnitude of Impact Scales from LA 111

Magnitude of Impact	Short term noise change (dB $L_{A10,18hr}$ or L_{night})	Long term noise change (dB $L_{A10,18hr}$ or L_{night})
Negligible	Less than 1.0	Less than 3.0
Minor	1.0 to 2.9	3.0 to 4.9
Moderate	3.0 to 4.9	5.0 to 9.9
Major	Greater than or equal to 5.0	Greater than or equal to 10.0

5.8.15. LA 111 (**Ref 5.12**) 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 non-significant adverse effect.

5.8.16. Following this initial assessment of potential significance, LA 111 (**Ref 5.12**) suggests that other factors should be considered when determining the potential likely significant adverse effect at an individual, or group of receptors. These factors include:

- the long-term magnitude of impact (as determined by the scale presented in **Table 5-5**);
- the absolute noise level in terms of the LOAEL and SOAEL thresholds - for example, LA 111 (**Ref 5.12**) suggests that a receptor experiencing a minor adverse impact which is also above SOAEL would be a potential likely significant adverse effect;
- location of the noise sensitive parts of a receptor;
- acoustic context; and
- likely perception of change by residents.

5.8.17. The absolute noise levels predicted at noise sensitive receptors will also be compared to the LOAEL and SOAEL thresholds, as advised in the NPSE (**Ref 5.8**). The operational noise LOAEL and SOAEL thresholds are set out in LA 111 (**Ref 5.12**) Table 3.49.1 which is reproduced below in **Table 5-6**. These are also considered to be appropriate to use for the construction road traffic noise assessment.

Table 5-6: Operational Road Traffic Noise LOAEL and SOAEL Thresholds (from LA 111)

Time Period	LOAEL	SOAEL
Day (06:00 – 24:00)	55 dB $L_{A10,18hr}$	68 dB $L_{A10,18hr}$
Night (00:00 – 06:00)	40 dB $L_{night, outside}$ (free-field)	55 dB $L_{night, outside}$ (free-field)

OPERATION PHASE

Operational Road Traffic Noise

5.8.18. An assessment of noise impacts arising as a result of traffic generated by the operation of the Proposed Scheme will be undertaken using the same methodology as that set out for construction road traffic.

Operational Noise

5.8.19. Using the results of the baseline survey, noise emission targets for external plant items will be derived in accordance with BS 4142:2014+A1:2019 (**Ref 5.10**).

5.8.20. BS 4142 (**Ref 5.10**) 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.”

5.8.21. A 3D noise model will be prepared to determine any likely noise impacts arising from operation of the Proposed Scheme. The model will include the information from the design process including geo-referenced plant items, heights and sound power levels. The noise propagation will be calculated in line with ISO 9613 Part 2 (**Ref 5.13**) and assessed against the criteria determined in line with the guidance in BS 4142 (**Ref 5.10**).

5.8.22. Where necessary, the assessment will outline noise mitigation measures. The noise model will be used to quantify the acoustic benefits of these measures.

5.9. ASSESSMENT LIMITATIONS AND ASSUMPTIONS

5.9.1. The following limitations and assumptions have been identified:

- Baseline conditions and identification of receptors should be considered indicative. Further assessment will be undertaken to identify all receptors within the Study Area and to establish the existing noise climate; and
- There is no detailed design information available at the time of preparing this EIA Scoping Report. Therefore, the opportunities for mitigation, where required, will be assessed once these data become available. The assessment presented in the PEIR and ES will include the latest design information available at the time of their submission. Where design information is not available, worst-case assumptions will be made.

5.10. REFERENCES

Ref 5.1: Department of Energy and Climate Change Available. (2011). 'Overarching National Policy Statement for Energy (2011)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 5.2: Department of Energy and Climate Change Available. (2021). 'Draft Overarching National Policy Statement for Energy (2011)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf

Ref 5.3: Ministry of Housing Communities & Local Government. (2021). 'National Planning Policy Framework'. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

Ref 5.4: Greater London Authority. (2021). 'The London Plan'. Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

Ref 5.5: London Borough of Bexley. (2012). 'Bexley Core Strategy'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Core-Strategy.pdf

Ref 5.6: London Borough of Bexley. (2004). 'Unitary Development Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-12/Bexley-unitary-development-plan-written-statement-2004.pdf

Ref 5.7: London Borough of Bexley. (2021). 'Draft Local Plan 2021'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-10/Draft-local-plan-proposed-submission-document-reg-19-may-2021.pdf

Ref 5.8: DEFRA. (2010). 'Noise Policy Statement for England (2010)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf

Ref 5.9: Greater London Authority. (2018). 'London Environment Strategy'. Available at: https://www.london.gov.uk/sites/default/files/london_environment_strategy_0.pdf

Ref 5.10: British Standards Institution. (2014). 'BS 5228:2009+A1:2014 Noise and vibration control on construction and open sites Part 1: Noise. Part 2: Vibration'.

Ref 5.11: British Standards Institution. (2019). 'BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound'.

Ref 5.12: Department of Transport. (1988). 'Calculation of Road Traffic Noise'. HMSO

Ref 5.13: Highways England. (2020). 'HE-DMRB-SE LA 111 Noise and vibration, Revision 2'. Available at: https://www.thenbs.com/PublicationIndex/documents/details?Pub=HA&DocID=329426

Ref 5.14: ISO 9613. (1996). 'Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation'.

Ref 5.15: UK Government. (1974). 'The Control of Pollution Act 1974'. Available at: https://www.legislation.gov.uk/ukpga/1974/40

Ref 5.16: UK Government. (1990). 'Environmental Protection Act'. Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents

Ref 5.17: Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government. (2021). 'National Planning Practice Guidance, Healthy and Safe Communities'. Available at: https://www.gov.uk/guidance/health-and-wellbeing

6. TERRESTRIAL BIODIVERSITY

6.1. INTRODUCTION

6.1.1. This chapter considers the impacts of the Proposed Scheme on terrestrial biodiversity during construction and operation, and potential significant effects. It sets out the proposed methodology for the terrestrial biodiversity assessment and identifies those impacts that can be scoped out of the assessment. Where necessary further assessment will be presented in the ES.

6.1.2. This assessment does not duplicate information contained in the marine biodiversity assessment set out in **Chapter 7: Marine Biodiversity**.

6.2. POLICY, LEGISLATION, AND GUIDANCE

6.2.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is detailed in **Table 6-1**.

Table 6-1: Terrestrial Biodiversity – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011 (Ref 6.1)	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). • *"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 / 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 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*

Policy / Legislation / Guidance	Description
	supporting research and education" (Paragraph 5.3.13). • *"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 for Energy EN-1 2021 (Ref 6.2)	The Government has published a draft update to the Overarching National Policy Statement for Energy. This 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 National Planning Policy Framework (NPPF) 2021 (Ref 6.3)	Presents the Government's planning policies for England and how these should be applied. Two paragraphs from the NPPF are considered directly relevant to the Proposed Scheme with regard 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*

Policy / Legislation / Guidance	Description
	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 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[4] and a suitable compensation strategy exists*".
The London Plan 2021 (Ref 6.4)	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. The London Plan contains the following policies relating to terrestrial biodiversity: • 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"*.

[4] 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 / 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"*.
London Borough of Bexley Core Strategy 2012 (Ref 6.5)	The Core Strategy sets out the Council's long term vision for development in the borough. It aims to support a strong, sustainable and cohesive community. The Core Strategy contains a number of policies relating to wildlife and habitats including: • CS01: Achieving Sustainable Development – *"protecting designated areas, such as metropolitan green belt, from inappropriate development so as to preserve, enhance and promote Bexley's network of open spaces and waterways, heritage, biodiversity and geological assets".* • CS06: Sidcup Geographic Region – *"ensuring development protects and enhances biodiversity and supports improvements to identified deficiencies in biodiversity".* • CS09: Using Bexley's Resources Sustainably – *"working with partners to make sure any leisure, transport, freight or development activities on and adjacent to the River Thames and other riverside areas are not detrimental to the quality of the environment in those areas".* • CS17: Green Infrastructure – *"protecting and enhancing the biodiversity, heritage and archaeological values of open spaces, including the Rivers Thames, Cray, Shuttle and their tributaries within the borough; protecting significant green corridors, and seeking opportunities to increase*

Policy / Legislation / Guidance	Description
	connectivity between the network of green spaces and habitats". • CS18: Biodiversity and Geology – *"protecting, conserving and enhancing Bexley's Sites of Special Scientific Interest (SSSI) and Sites of Importance for Nature Conservation (SINC); resisting development that will have a significant impact on the population or conservation status of protected species and priority species as identified in the UK, London and Bexley Biodiversity Action Plans; protecting and enhancing the natural habitat as far as practicable, seeking biodiversity enhancements and improved access to nature".*
London Borough of Bexley Unitary Development Plan 2004 – 'Saved' Policies (Ref 6.6)	The main purpose of the Unitary Development Plan is to provide a framework for guiding development, and to show how land will be used as a resource for achieving the Council's wider objectives. Adopted in 2004 the UDP preceded the Bexley Core Strategy. Some policies expired in 2007 and some were replaced by the Core Strategy in 2012. Relevant UDP policies not replaced by the Core Strategy are as follows: • ENV15 – *"Within Metropolitan Open Land, there will be a presumption against permitting the construction of new buildings, or the change of use of land or buildings for purposes other than: 1 agriculture and forestry; 2 predominantly open air recreation; 3 nature conservation; 4 educational and institutional uses in extensive grounds; 5 cemeteries; or 6 other uses which would maintain the open character or visual amenities of Metropolitan Open Land".* • ENV28 – *"The Council will declare and manage as Local Nature Reserves (LNR) sites in which it has a legal interest, that*

Policy / Legislation / Guidance	Description
	are of special importance to the local community for wildlife and nature conservation. Within these areas development will be resisted that would endanger the preservation of those special characteristics that lead to designation". • TS15 – *"The Council will promote the protection of wildlife and the improvement for wildlife of the river and of habitats on Thames-side, including its adjacent minor watercourses and dikes. Development that diminishes these habitats will be resisted".*
London Borough of Bexley Draft Local Plan 2021 (Ref 6.7)	The new Local Plan is awaiting adoption and will then replace the Bexley Core Strategy and Saved UDP policies 2012. It contains a number of policies relating to biodiversity within the borough including: • 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 • 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 will not be permitted unless all of the following criteria are met:*

Policy / Legislation / Guidance	Description
	a) there are no reasonable, less damaging, alternative solutions, locations or sites; *b) ecological buffer zones have been incorporated into the scheme, where appropriate, to protect and enhance the designated site's intrinsic value;* *c) the continuity of wildlife habitat within wildlife corridors is maintained; and* *d) access to the designated site is not compromised and where possible, access and/or interpretation is improved"*.
The UK Post-2010 Biodiversity Framework 2012 (Ref 6.8)	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, 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.
Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services 2011 (Ref 6.9)	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 (Ref 6.10)	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 a number of habitats and

Policy / Legislation / Guidance	Description
	species (including marine/estuarine habitat and species) within Bexley for which targets have been set to increase their range and distribution.
Legislation	
The Wildlife and Countryside Act 1981 (as amended) (WCA) (Ref 6.11)	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 (Ref 6.12)	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 (Ref 6.13)	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*

Policy / Legislation / Guidance	Description
	with the proper exercise of those functions, to the purpose of conserving biodiversity". This duty was extended by the Environment Act 2021 so that public authorities must, through their decisions, further "*the general biodiversity objective*", meaning 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 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 (Ref 6.14)	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 (Ref 6.15)	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.

Policy / Legislation / Guidance	Description
	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 (Ref 6.16)	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.
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 (Ref 6.17)	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)[5]"; 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"*.

[5] European sites include: Special Areas of Conservation (SAC), Special Protection Areas (SPA), Sites of Community Importance (SCI), and candidate SACs. UK Government policy (ODPM Circular 06/2005) 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 / Guidance	Description
	In the case of the Proposed Scheme, the competent authority is the Secretary of State ('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 negatively impact a European Site, Regulation 64 of the Habitats Regulations provides that the competent authority may agree to the plan or project notwithstanding that negative 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 negative 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 negatively impacted hosts a priority natural habitat type[6] 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*[7]".

[6] See Article 1(d) of EC Directive 92/43/EEC.
[7] See Article 1(h) of EC Directive 92/43/EEC.

Policy / Legislation / Guidance	Description
	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 7: Marine Biodiversity**), 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.
The Environment Act 2021 (Ref 6.18)	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 of the Planning Act 2008. It is expected that the mandatory requirement for a 10% gain will come into force in 2025. As part of the DCO Application, a BNG assessment for the Proposed Scheme will be submitted.
National Parks and Access to the Countryside Act 1948 (Ref 6.19)	The Act provides the framework for the creation of National Parks and the establishment of a National Parks Commission. The Act confers on Natural England and local authorities powers for the establishment and

Policy / Legislation / Guidance	Description
	maintenance of nature reserves; to make further provision for the recording, creation, maintenance and improvement of public paths and for securing access to open country, and to amend the law relating to PRoWs.
The Salmon and Freshwater Fisheries Act 1975 (Ref 6.20)	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 (Ref 6.21)	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

Policy / Legislation / Guidance	Description
	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”.
Guidance	
National Planning Practice Guidance (2021) (Ref 6.22)	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 EIA 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	These pieces of guidance aim to increase the quality of ecological reports supporting

Policy / Legislation / Guidance	Description
(CIEEM) guidance (Ref 6.23)	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.

6.3. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

6.3.1. The key sources of information on baseline terrestrial and aquatic biodiversity conditions will be:

- Open source 1:25,000 Ordnance Survey datasets (**Ref 6.24**);
- Freely downloadable Natural England datasets and citations (**Ref 6.25**);
- Multi Agency Geographic Information System Mapping (MAGIC) (**Ref 6.26**);
- Environment Agency Ecology and Fish Data Explorer (**Ref 6.27**);
- Greenspace Information for Greater London (**Ref 6.28**); and
- Site walkovers and surveys undertaken to map habitats within the Site Boundary.

6.3.2. A short summary of the baseline conditions is presented below.

6.3.3. The information gathered and presented within the ES for Riverside 2 will inform the baseline relevant to terrestrial biodiversity, where relevant.

Designated Sites

6.3.4. The designated sites described within this section are shown on **Figure 2-1 (Sheet 3)** of **Chapter 2: Site and Proposed Scheme Description**.

6.3.5. There is one internationally designated terrestrial biodiversity site within 15km of the Site Boundary, the Epping Forest SAC which is located approximately 11.8km north of the Site Boundary. There are six statutory nature conservation sites designated as SSSIs within 10km of the Site Boundary and there are three statutory nature conservation sites designated as LNR/NNR within 2km of the Site Boundary. All are described further in **Table 6-3**).

6.3.6. It should be noted six further SSSIs are found within 10km of the Site Boundary but these are designated for geological features only, possessing no biological features in their citation, and thus they are not in the scope of the assessment.

6.3.7. Three non-statutory designated sites are partially located within the Site Boundary (which are described further in **Table 6-2**).

6.3.8. A further 18 non-statutory designated sites are situated within 2km of the Site Boundary, the closest of which is 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.

6.3.9. Desk Study Areas were selected on the basis of Chartered Institute of Ecology and Environmental Management (CIEEM) guidance (**Ref 6.23**) and professional judgement. Based on the particular characteristics of the Site and the Proposed Scheme, direct and indirect impacts are unlikely to extend beyond these areas.

Table 6-2: Designated Sites Summary

Designated Site	Distance from Site Boundary	Description
Epping Forest SAC	Approximately 11.8km north-west	Epping forest is London and Essex's largest green space and hosts over a million trees, many of which are veterans; including ancient stands of beech, oak and hornbeam. The long history of pollarding has led to significant amounts of dead wood, which has made the area rich in fungi, epiphytes – including the moss *Zygodon forsteri*, and rare insect species like the stag beetle (*Lucanus cervus*).
Inner Thames Marshes SSSI	Approximately 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*.
Abbey Wood SSSI	Approximately 1.6km southwest	Abbey Wood SSSI contains some of the most fossiliferous deposits in the Greater London area providing remains of a diverse mammal assemblage of early Tertiary age. The deposits are also important for studies in the evolution of bird faunas. The SSSI covers deposits of late Palaeocene age (Blackhead (Beds) Formation) including a unique and valuable exposure of the Blackheath Shell Bed approximately 2 metres below ground level. Excavations of these Beds

Designated Site	Distance from Site Boundary	Description
		have yielded an important mammalian fauna of 22 species attributable to 12 orders.
Ingrebourne Marshes SSSI	Approximately 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. Havering Council has raised the water level and reintroduced grazing to protect the wetland.
Oxleas Woodlands SSSI	Approximately 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 into the London Borough of Bexley), 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.
West Thurrock Lagoon and Marshes SSSI	Approximately 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	Approximately 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

Designated Site	Distance from Site Boundary	Description
		include the rare club rush *Schoenoplectus tabernaemontani*. The open water areas have rafts of yellow and white water-lily *Nuphar* spp.
Crossness LNR	Within the Site Boundary	A network of ditches and open water, scrub and rough grassland, providing a water vole *Arvicola amphibius* stronghold. Over 130 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	Approximately 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	Approximately 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.
SINCs	Ranging from within the Site Boundary, to approximately 2km from the Site Boundary	River Thames and tidal tributaries SINC falls within the Site Boundary: 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 SINC falls within the Site Boundary: One of the few remaining examples of the Thames-side grazing marshes, important for

Designated Site	Distance from Site Boundary	Description
		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 Boundary: The drainage dykes comprising reedbed, wet woodland and grassland habitats. There are 18 further SINCs 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 SINCs 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 north east); • 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);

Designated Site	Distance from Site Boundary	Description
		• 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 north west); and • Streamway, Chapman's Land and Erith Cemetery SINC (2km to the south).

6.3.10. Specific Habitats Regulations Assessment (HRA) documentation will be provided separately to this Report. The National Network sites are as presented within this section.

Habitats

Habitats of Principal Importance (HPI)

6.3.11. Desk study data confirmed parcels of deciduous woodland HPI, coastal floodplain and grazing marsh HPI; intertidal mudflats HPI fall within the Site Boundary. 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 HPIs in relation to the Site Boundary are shown on **Figure 6-1.**

6.3.12. There is no ancient woodland within the Site Boundary or within 1km of the Site Boundary (as detailed in **Chapter 9: Townscape and Visual Impact**).

N

The London Borough of Barking and Dagenham

The London Borough of Bexley

The London Borough of Havering

Halfway Reach

River Thames

Rainham Creek

Lower Belvedere

Bexley London Bororough

Erith Reach

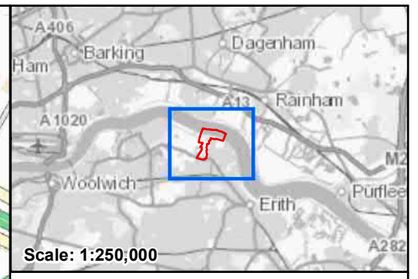
Belvedere

Education Facility

Education

0 50 100 200 300 400 500 600 700 800 900 1,000

Metres



Legend

- Site Boundary
- Study Area (250m)
- Coastal and floodplain grazing marsh
- Coastal saltmarsh
- Deciduous woodland
- Good quality semi improved grassland
- Mudflats
- No main habitat but additional habitats present
- Reedbeds
- Reedbeds, coastal saltmarsh
- Pioneer
- Spartina
- Mid-low
- Upper marsh
- Reedbeds
- Unclassified
- Local Authority Boundary

Service Layer Credits: Contains OS Data © Crown copyright and database rights 2023

P00	NC	JH	RA	29/03/2023
SECOND DRAFT ISSUE				
REVISION	DRAWN	CHECKED	APPROVED	DATE
DESCRIPTION				

PROJECT TITLE:

CORY DECARBONISATION PROJECT

DRAWING TITLE:

FIGURE 6-1: HABITATS OF PRINCIPAL IMPORTANCE

CONFIDENTIALITY: PUBLIC

DRAWN:	CHECKED:	APPROVED:	AUTHORISED:
NC	JH	RA	JW
SCALE @ A3 SIZE: 1:10,000		DATE: 29/03/2023	REVISION: P00

DRAWING NUMBER:

70090329-WSP-00-XX-RP-EN-0203-P01-S0

Other Habitats

6.3.13. The majority of the Site comprises river habitat (approximately 50%) and the principal terrestrial habitat types within the Site comprise coastal floodplain and grazing marsh (approximately 12%), modified grassland (approximately 5%), reedbeds (approximately 5%), other neutral grassland (approximately 4%), artificial unvegetated unsealed surface (approximately 3%), mixed scrub (approximately 2%) intertidal mudflats (approximately 1%), lowland mixed deciduous woodland (approximately 1%) and standing water (approximately 1%).

6.3.14. The remaining habitat is formed of developed land, hardstanding and buildings that have been scoped out of further assessment as they have no ecological value.

Freshwater Aquatic Habitats

6.3.15. An aquatic habitat scoping assessment 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.

6.3.16. The majority of 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, no channel features (such as pools, riffles and bars) and no marginal features (such as exposed/submerged tree roots and undercut banks).

Protected/Notable Species

Badger

6.3.17. The Site does not provide suitable habitat for badger *Meles meles* due to the high water table (preventing sett building) and its fragmented, industrialised nature. It is noted that badgers were not included within the scope of the Riverside Energy Park (Riverside 2) Environmental Statement (ES) (**Ref 6.29**).

Bats

6.3.18. Desk study records show eight bat 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.

6.3.19. A Preliminary Bat Roost Assessment (PBRA) of the buildings within the Site Boundary was undertaken in July 2022. The assessment concluded that all buildings on Site have negligible bat roost potential. This is in line with findings of the Riverside Energy Park (Riverside 2) ES (**Ref 6.29**).

6.3.20. Survey visits (undertaken in February 2023) identified no semi-mature or mature trees to be present which provide roosting opportunities for bats. However, due to access constraints at the time of surveying, further surveys within the Site Boundary will be undertaken to determine the presence of suitable bat roosting features, notably of the woodland at the southern boundary and the two jetties on the banks of the River Thames.

6.3.21. Bat foraging habitat on 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 (**Ref 6.30**).

6.3.22. All bats are afforded protection under the Wildlife and Countryside Act 1981 (as amended) and the Habitat Regulations. Noctule, brown long-eared bat and soprano pipistrelle bat are also listed as a Species of Principal Importance (SPI) for the Conservation of Biodiversity in England under Section 41 of the NERC Act 2006.

Breeding Birds

6.3.23. Desk study results recorded 59 species of bird; 19 species were Wildlife and Countryside Act Schedule 1 species and 30 were Birds of Conservation Concern Red listed.

6.3.24. Crossness LNR and Crossness Sewage Works are also known to be of value to bird communities.

Great Crested Newt

6.3.25. Suitable terrestrial and freshwater aquatic habitat for great crested newts *Triturus cristatus* was identified within the Site Boundary during the habitat survey undertaken in February 2023. However, the Site Boundary does not fall within the area of LBB where great crested newt should be considered within planning applications (**Ref 6.31**), indicating they are known to be absent from this location. No great crested newt records were returned during the desk study. The Thames Water Crossness LNR manager also has confirmed there are no records of great crested newt within the LNR (email dated 17/02/2023).

Hazel Dormouse

6.3.26. The desk study did not return results for hazel dormouse *Muscardinus avellanarius* and the majority of the Site Boundary does not contain suitable habitat for this species. The small area of woodland and scrub in the south of the Site may be suitable for supporting dormouse, but to date access has not been possible. 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 are present within the Site.

Notable Plants and Invasive Species

6.3.27. The desk study returned one non-native invasive fauna and 20 flora species within 2km of the Site Boundary, listed on Schedule 9 of the Wildlife and Countryside Act and/or the London Invasive Species List. The Site may therefore support important plant species.

Reptiles

6.3.28. 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 floodplain and grazing marsh, semi-improved grassland and mixed scrub habitats in the Site 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 (**Ref 6.32**), 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 the Riverside 2 facility to avoid effects on reptiles (**Ref 6.33**).

6.3.29. All three reptile species are partially protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). They are also listed as SPI for the Conservation of Biodiversity in England under Section 41 of the NERC Act 2006.

Otter

6.3.30. The desk study did not return any records of otter *Lutra lutra*, and the majority of the Site does not provide suitable habitat for otter holts, despite the close proximity of the River Thames which is known to support otter (**Ref 6.34**). The small area of woodland and scrub in the south of the Site 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 (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

6.3.31. The desk study returned 23 notable terrestrial invertebrate species records, including: 17 species listed under Section 41 of the NERC Act 2006; 17 London priority species; and two species listed under Annex II of the Habitats Regulations. 22 of these notable species were recorded in close proximity to the Site (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 SPI when carrying out their functions.

6.3.32. Coastal floodplain and 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

6.3.33. Two hundred and seventy-eight records of water vole *Arvicola amphibius* were returned by the desk study. Recnt water vole surveys undertaken within the central part of the Site (in 2022, as part of the Riverside Heat Network Project) (**Ref 6.32**), recorded evidence of water vole in the ditches throughout the Site. In addition, multiple surveys in recently years for various projects, including Riverside 2, show an important water vole population are present within the Site Boundary (**Ref 6.29**). Management and maintenance of ditches for water vole is undertaken in compliance with previously approved schemes.

6.3.34. 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 Wildlife and Countryside Act 1981 (as amended). 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. Public bodies have an obligation under Section 40 to have regard for these species when carrying out their functions.

Wintering Birds

6.3.35. 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.

Freshwater Fish

6.3.36. A search of the Environment Agency's Ecology and Fish Data Explorer returned no records of fish data from within the Site Boundary. The River Thames, however, is known to support European eel *Anguilla anguilla* (**Ref 6.27**). Given the likely hydrological connection between the River Thames and the freshwater watercourses present within the Site Boundary, it can be assumed that European eel may be present within the Site.

6.3.37. European eel is a migratory species that is listed under Section 41 of the NERC Act (2006) as a Species of Principal Importance (SPI). The species is afforded further protection under The Eels (England and Wales) Regulations (2009) and is listed on the International Union for Conservation of Nature Red List of Threatened Species as being critically endangered (**Ref 6.35**).

Aquatic Macroinvertebrates

6.3.38. A search of the Environment Agency's Ecology and Fish Data Explorer returned data from Environment Agency aquatic macroinvertebrate surveys at a monitoring location on a watercourse within the Site Boundary (NGR TQ 49318 80312), undertaken in spring and autumn 2013. In the spring sample, the following Invasive Non-Native Species (INNS) were recorded: the New Zealand mudnsail *Potamopyrgus antipodarum*; the bladder snail *Physella acuta;* and the amphipod *Crangonyx pseudogracilis/floridanus*. The New Zealand mudsnail and the bladder snail were also recorded in the autumn sample alongside the amphipod *Gammarus tigrinus*. No protected aquatic macroinvertebrate species were recorded in either sample.

6.3.39. The calculated Community Conservation Index (CCI) value of 14.64 classifies the Environment Agency spring sample as having an aquatic macroinvertebrate community of Fairly High conservation value (**Ref 6.36**). Whilst the CCI score of 4.93 classifies the Environment Agency autumn sample as having an aquatic macroinvertebrate community of Low conservation value.

Macrophytes

6.3.40. A search of the Environment Agency's Ecology and Fish Data Explorer returned data from an Environment Agency macrophyte survey at a monitoring location on a watercourse within the Site Boundary (NGR TQ 49318 80312), carried out in August 2013. A total of 17 macrophytes species were recorded in the survey, all of which are recorded as flowering macrophyte species. No protected or otherwise notable macrophyte species were recorded in the survey, nor were any INNS.

6.3.41. The most dominant species recorded in the Environment Agency macrophyte survey were reedmace *Typha latifolia* and common reed *Phragmites australis*. During the freshwater aquatic habitat scoping assessment, common reed and reedmace were noted within the watercourses present within the Site Boundary.

FUTURE BASELINE

Overview

6.3.42. 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, 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.

6.3.43. 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. Moorcroft & Speakman (**Ref 6.37**) 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.

6.3.44. 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.

6.3.45. 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.

6.3.46. The future baseline assumes that existing commercial business within the Site Boundary would remain at their current locations should the Proposed Scheme not proceed. These include Riverside 1, the Middleton Jetty and the Munster Joinery Warehouse. Riverside 2 would be operational in the future baseline.

Habitats

6.3.47. 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 and water meadows, which may lead to a change in species composition in these habitats.

6.3.48. 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 (**Ref 6.38**).

Bats

6.3.49. Collins (**Ref 6.29**) examined trends in 11 species compared to a baseline year of 1999. This research found that these species were either stable or increasing. Climate change may however affect bat populations through changes in their annual hibernation cycle, breeding success and food availability.

Breeding Birds

6.3.50. The British Trust for Ornithology (BTO) (**Ref 6.39**) 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.

6.3.51. 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), and the breeding water and wetland bird index for the UK fell by 6% between 1975 and 2018, but over the short term increased slightly by 3%.

Notable Plants and Invasive Species

6.3.52. Botanical species in the UK are generally in decline. State of Nature 2019 (**Ref 6.40**) 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 (**Ref 6.40**) 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

6.3.53. Evidence from the BTO Research Report 572 (**Ref 6.41**) 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 (**Ref 6.42**).

Terrestrial Invertebrates

6.3.54. State of Nature 2019 (**Ref 6.40**) 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.

6.3.55. London is a hotspot for stag beetle, however they have been in steep decline across Europe (**Ref 6.43**). 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

6.3.56. Water voles were formerly widespread and common in England, Wales and Scotland, ranging from Cornwall to the extreme north-east 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 (**Ref 6.44**). Re-introduction programmes are attempting to slow the decline, but to date their effect on the conservation status of water vole is as yet unknown.

Wintering Birds

6.3.57. 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 north-eastwards to new feeding grounds.

Freshwater Fish

6.3.58. Climate change is known to be affecting the River Thames, with both water temperature and sea levels continuing to rise above historic baselines (**Ref 6.45**). Studies have shown that the number of fish species found in the Tidal Thames is declining, however further research is needed to determine the cause of this observed decline (**Ref 6.45**).

Aquatic Macroinvertebrates

6.3.59. 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 (**Ref 6.46**).

6.3.60. 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 (**Ref 6.46**).

6.3.61. 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 (**Ref 6.47**).

Macrophytes

6.3.62. Changes in temperature, CO_2 and precipitation linked to climate change have the potential to directly alter macrophyte communities within UK freshwater systems. It has been shown that 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 (**Ref 6.48**).

Summary

6.3.63. 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) are likely to have a greater influence on biodiversity over much of the Study Area (described in **Section 6.4** below).

6.3.64. 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.

6.4. STUDY AREA

6.4.1. For the assessment of impacts during construction and operation, the Study Areas for potential sensitive receptors are set out in **Table 6-3**. This approach is consistent with current good practice guidelines published by the Chartered Institute of Ecology and Environmental Management (CIEEM) (**Ref 6.23**).

6.4.2. The assessment will consider the likely effects of the Proposed Scheme on ecological features within Proposed Scheme's Zone of Influence (ZOI). Zone of Influence is a term used in CIEEM Guidance (**Ref 6.23**) 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 Boundary and the wider landscape, where pathways exist for the transfer of impacts away from the Site Boundary.

6.4.3. 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 Proposed Scheme's ZOI has been determined by:

- consideration of the activities during construction and operation associated with the Proposed Scheme and the scale of the works;
- 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.

6.4.4. The ZOI is the same for terrestrial biodiversity for both the construction and operation phases.

Table 6-3: Terrestrial Biodiversity Zone 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 and adjacent to the Site Boundary.
Bats	Within the Site Boundary and 25m of the Site.
Breeding Birds	Within the Site Boundary and 25m of the Site.
Notable Plants and Invasive Species	Within the Site Boundary and 25m of the Site.
Reptiles	Within the Site Boundary and 25m of the Site.
Terrestrial Invertebrates	Within the Site Boundary and 25m of the Site.
Water Vole	Within the Site Boundary and 250m of the Site.
Wintering Birds	Within the Site Boundary and along the adjacent section of the River Thames.

Receptor	Zone of Influence
Freshwater Fish	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.

6.5. SENSITIVE RECEPTORS / RESOURCES

6.5.1. The following likely sensitive receptors have been identified:

STATUTORY DESIGNATED SITES

- Epping Forest SAC;
- Inner Thames Marshes SSSI;
- Abbey Wood 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 SINC;
- Belvedere Dykes SINC;
- River Thames and Tidal Tributaries SINC; and
- 18 further SINCs outside of the Site Boundary.

HPI

- Deciduous woodland;
- Coastal floodplain and grazing marsh;
- Intertidal mudflats; and
- Coastal saltmarsh (adjacent to the Site Boundary).

OTHER TERRESTRIAL HABITATS

- River habitat;
- Coastal floodplain and grazing marsh;

- Modified grassland;
- Reedbeds;
- Other neutral grassland;
- Artificial unvegetated unsealed surface;
- Mixed scrub;
- Intertidal mudflats;
- Lowland mixed deciduous woodland; and
- Standing water.

PROTECTED/NOTABLE SPECIES

- Bats;
- Breeding birds;
- Notable plants and invasive species.
- Reptiles;
- Terrestrial invertebrates;
- Water vole;
- Wintering birds;
- Freshwater fish;
- Aquatic macroinvertebrates; and
- Macrophytes.

6.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

6.6.1. In the first instance, adverse impacts on ecological features during the Proposed Scheme's construction and operation will be avoided and important ecological features retained wherever possible.

6.6.2. The Proposed Scheme will likely result in the loss of part of Crossness LNR. A comprehensive mitigation and compensation strategy will be developed to minimise and account for these impacts, including proposals for off-site habitat creation/enhancements. This mitigation and compensation strategy is at the early stages of development.

CONSTRUCTION PHASE

6.6.3. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- implementation of a Code of Construction Practice (CoCP);
- adherence to relevant Environmental Permits, Best Practice Guidance and Regulations, British Standards, and monitoring for the protection of ecological features; and

- 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.

6.6.4. 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 significant adverse effect, compensation measures will be implemented. These will constitute a range of different interventions, depending on the species or habitat.

6.6.5. The main interventions may be grouped into the following general approaches:

- Habitat creation – creation of new areas of floodplain grazing and grassland to replace those potentially lost to the Proposed Scheme. 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; and
- Creation of features to offer replacement breeding, sheltering and hibernating opportunities for animal species, for example, reptile hibernacula, bat and bird boxes.

6.6.6. 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.

OPERATION PHASE

6.6.7. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- 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 6.8**, and having regard to planning policy requirements and/or the legislative protection afforded to the ecological feature; and
- managing operation 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.

6.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

6.7.1. The potential likely significant effects associated with the construction phase may include:

- habitat loss and fragmentation, which may lead to disturbance, displacement and loss of biodiversity;
- construction noise and vibration which may lead to disturbance of species;
- dust which may lead to disturbance of species;
- surface water run-off which may lead to additional habitat destruction and loss of biodiversity;
- lighting which may lead to disturbance of nocturnal species; and
- change in air quality which may lead to effects on habitats and species.

OPERATION PHASE

6.7.2. The potential likely significant effects associated with the operation phase include:

- disturbance to species as a result of noise and vibration from the operation of the Proposed Scheme;
- disturbance to species as a result of maintenance activities during the operation phase;
- surface water run-off and discharge from operational activities which may lead to effects on aquatic species;
- lighting that may lead to disturbance of nocturnal species; and
- changes in air quality from operational emissions which may lead to effects on habitats and species.

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

6.7.3. The impacts scoped in or out for Terrestrial Biodiversity are as set out in **Table 6-4**. As set in Section 6.3, badger, great crested newt, hazel dormouse and otter have been scoped out of any further impact assessment.

Table 6-4: Terrestrial Biodiversity - Impacts Scoped In or Out of Further Assessment

Impacts	Phase	Scoped In	Scoped Out	Justification
Habitat loss and fragmentation	Construction	✓		Loss or fragmentation of habitats within the Site Boundary has the potential to generate a permanent, long-term impact on biodiversity within the Site Boundary and immediate surroundings.
Noise and vibration	Construction and Operation	✓		Noise and vibration from construction and operational activities could generate a permanent, long-term impact within the Site and immediate surroundings.
Maintenance activities	Operation		✓	Human activity may increase slightly as a result of operational maintenance and works; however, this increase is assumed to be relatively low, and species present within the Site and immediate surrounds are already climatised to existing levels of human activity at the Site due to the presence of Riverside 1 and other industrial facilities within or in close proximity to the Site Boundary.
Dust	Construction	✓		The construction of the Proposed Scheme has the potential to generate dust close to Crossness LNR. Consequently, there is potential for short term, temporary impacts within the Site Boundary and immediate surroundings.
Surface water run-off	Construction and Operation	✓		Any surface water run-off and discharge released carrying pollutants during construction activities and the operation phase could reach the watercourses within the Site Boundary. Therefore, there is potential to generate a permanent, long-term impact within the Site Boundary and surroundings due to hydrological connectivity.

Impacts	Phase	Scoped In	Scoped Out	Justification
Lighting	Construction and Operation	✓		The additional artificial lighting required for construction and operation activities has the potential to generate a permanent, long term impact within the Site Boundary and immediate surroundings due to light spill.
Changes in air quality	Construction and Operation	✓		Air quality may be affected by increased road traffic on the local road network and increased vessel movements which in turn would affect ambient pollutant levels. Changes to the emissions from Riverside 1 and 2 may also occur during operation. Therefore, there is potential for long term impacts within the Site Boundary and immediate surroundings. Further information is provided in **Chapter 4: Air Quality** of this Report.

6.8. PROPOSED ASSESSMENT METHODOLOGY

6.8.1. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with LBB and the EA.

FURTHER SURVEYS

6.8.2. Further surveys are planned for 2023 and are listed below. The findings of these surveys will be reported in the ES. Some of the surveys listed below were underway at the time of preparing this chapter.

- Bats:
  - A further PBRA will be undertaken between April and June 2023 to identify potential roost features within the Site Boundary where access was previously not available. Any dusk emergence or dawn re-entry surveys required following the PBRA to confirm presence or absence will be undertaken between May and September 2023; and
  - Bat activity surveys (using static monitoring equipment) will be undertaken from May to September 2023 to provide a comprehensive dataset for bat activity on the Site and to identify important commuting and foraging resources within the Site Boundary.
- Breeding Birds:
  - Breeding bird surveys will be undertaken from March to June 2023, within the Site Boundary.
- Notable Plant and Invasive Species:
  - INNS botanical survey will be undertaken between June and September 2023 within the Site Boundary; and
  - National Vegetation Classification (NVC) survey will be undertaken between June to July 2023 in order to classify the habitat types and their importance within the Site Boundary. This will include the Southeastern part of the Site that previously could only be assessed from a PRoW.
- Reptiles:
  - Reptile surveys will be undertaken from September to October 2023 within areas of suitable habitat within the Site Boundary.
- Terrestrial Invertebrates:
  - A terrestrial invertebrate survey will be undertaken between April and September 2023 to understand the potential for the Site to support rare or notable invertebrates or an invertebrate assemblage of significance/importance.
- Water Vole:
  - Water vole surveys will be undertaken from April to September 2023 across all ditches within the Site Boundary.
- Wintering Birds:

  - Wintering bird surveys began in November 2022 and will continue until March 2023. Surveys include land within the Site Boundary, and the adjacent areas of the River Thames.
- Freshwater Fish:
  - Fish e-DNA surveys will be undertaken in June 2023 within the freshwater watercourses identified within the Site Boundary.
- Aquatic Macroinvertebrates and Macrophytes:
  - Ditch surveys encompassing the surveying of both aquatic macroinvertebrates and macrophytes will be undertaken in June 2023 within the freshwater watercourses identified within the Site Boundary; and
  - Pond Predictive System for Multimetrics surveys will be undertaken in June 2023 on the standing water bodies identified within the Site Boundary.

ASSESSMENT METHODOLOGY

6.8.3. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with LBB, Natural England and the Environment Agency.

6.8.4. The EIA will be prepared in line with current good practice from CIEEM's Guidelines for Ecological Impact Assessment (**Ref 6.48**), in addition to the specific methodology detailed in **Chapter 3: EIA Methodology**. Each receptor will be evaluated within the geographic scale of reference and potential effects during the construction and operation phases of the Proposed Scheme.

6.8.5. 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 20: Cumulative Effects**);
- Identify 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 ecological enhancement.

6.8.6. For adverse impacts, CIEEM's Guidelines for Ecological Impact Assessment 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 **(Ref 6.49)**. 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.

6.8.7. This methodology will be used to assess both the construction and operation phases of the Proposed Scheme.

SIGNIFICANCE OF EFFECT CRITERIA

6.8.8. In determining the significance of a potential effect, the magnitude of change arising from the Proposed Scheme is correlated with the value/sensitivity of the particular environmental receptor or process under consideration. Further detail is provided below.

Magnitude

6.8.9. 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 for Ecological Impact Assessment, summarised in Table 6-6 below.

6.8.10. 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 – positive or negative;
- 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 6-5: 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

6.8.11. As described within **Chapter 3: EIA Methodology**, 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.

6.8.12. **Table 6-6** summarises the ecological feature conservation value and/or sensitivity adapted from CIEEM's Guidelines for Ecological Impact Assessment (**Ref 6.48**) 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 6-6: Terrestrial Biodiversity Description of Value and Sensitivity

Value/Sensitivity	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.

Value/Sensitivity	Criteria
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 SPI. A species population that would qualify for SSSI designation.
Regional/County	• 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. 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 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

Value/Sensitivity	Criteria
	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.

Significance

6.8.13. The overall significance will be assessed using the matrix shown in **Table 6-7**, which has been modified to align with **Chapter 3: EIA Methodology**. 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.

6.8.14. In accordance with **Chapter 3: EIA Methodology** any effects with a significance level of Moderate or above will be concluded to be significant.

Table 6-7: Significance of Effects Matrix

Value /Sensitivity	Magnitude of Impacts				
		High	**Medium**	**Low**	**Negligible**
	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

6.9. ASSESSMENT LIMITATIONS AND ASSUMPTIONS

6.9.1. The following limitations and assumptions have been identified:

- Initial botanical surveys within the Site Boundary were not completed during the optimal survey season for botanical species identification, generally accepted to be from April to September (inclusive). However, it is considered that sufficient information was gathered to enable an assessment of the habitat types present in line with standard UKHab categories and the potential for these to support protected or notable species. Further surveys (INNS and NVC surveys) will be undertaken during the optimal survey season in 2023 (as described in **Section 6.8**).
- The freshwater aquatic habitat scoping assessment at the Site was not completed during the optimal macrophyte survey season, generally accepted to be from June to September (inclusive). However, it is considered that sufficient information was gathered to enable an assessment of the macrophyte species present both within the freshwater watercourses and the ponds present within the Site Boundary. Further macrophyte surveys will be undertaken during the optimal survey season in 2023 (as described in **Section 6.8**).
- The Southeastern part of the Site could only be assessed from a PRoW as part of the initial surveys undertaken. Therefore, the condition of the pond and woodland habitats were not assessed and woodland type was assumed on a precautionary basis to be the same as suggested by the Natural England priority habitat inventory. Further surveys will be undertaken during the optimal survey season in 2023 (as described in **Section 6.8**).

6.10. REFERENCES

Ref 6.1: Department of Energy and Climate Change. (2011). 'Overarching National Policy Statement for Energy (EN-1). London: The Stationery Office'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 6.2: Department of Energy and Climate Change. (2021). 'Draft Overarching National Policy Statement for Energy (EN-1)'. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf

Ref 6.3: Ministry of Housing Communities & Local Government. (2021). 'National Planning Policy Framework'. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

Ref 6.4: Greater London Authority. (2021). 'The London Plan, The Spatial Development Strategy for Greater London March 2021'. Available at: https://www.london.gov.uk/programmes-strategies/planning/london-plan/new-london-plan/london-plan-2021

Ref 6.5: Bexley Borough Council. (2012). 'London Borough of Bexley Core Strategy February 2012'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Core-Strategy.pdfn

Ref 6.6: Bexley Council. (2004). 'Unitary Development Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-12/Bexley-unitary-development-plan-written-statement-2004.pdf

Ref 6.7: Bexley Borough Council. (2021). 'London Borough of Bexley Draft Local Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-10/Draft-local-plan-proposed-submission-document-reg-19-may-2021.pdf

Ref 6.8: JNCC and DEFRA. (2012). 'UK Post 2010 Biodiversity Framework'. Available at: https://jncc.gov.uk/our-work/uk-post-2010-biodiversity-framework/

Ref 6.9: Department for Environment, Food and Rural Affairs. (2011). 'A Strategy for England's Wildlife and Ecosystem Services. DEFRA, London'. Available at: https://www.gov.uk/government/publications/biodiversity-2020-a-strategy-for-england-s-wildlife-and-ecosystem-services

Ref 6.10: Greater London Borough of Bexley. (2011). 'The Bexley Biodiversity Action Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Biodiversity-Action-Plan-Adopted-June-2011.pdf

Ref 6.11: HMSO (Her Majesty's Stationary Office). (1981). 'Wildlife and Countryside Act (as amended by the Countryside and Rights of Way Act 2000)'. HMSO, Norwich. Available at: https://www.legislation.gov.uk/ukpga/2000/37/contents

Ref 6.12: HMSO. (2000). 'Countryside and Rights of Way Act 2000'. HMSO, London. Available at: https://www.legislation.gov.uk/ukpga/2000/37/contents

Ref 6.13: HMSO. (2006). 'Natural Environment and Rural Communities Act. HMSO, Norwich'. Available at: https://www.legislation.gov.uk/ukpga/2006/16/contents

Ref 6.14: HMSO. (1992). 'The Protection of Badgers Act'. Available at: https://www.legislation.gov.uk/ukpga/1992/51/contents

Ref 6.15: HMSO. (1997). 'The Hedgerows Regulations, SI 1997/1160. HMSO, London'. Available at: https://www.legislation.gov.uk/uksi/1997/1160/contents/made

Ref 6.16: HMSO. (1996). 'The Wild Mammals (Protection) Act. HMSO, London'. Available at: https://www.legislation.gov.uk/ukpga/1996/3/contents

Ref 6.17: HMSO. (2017). 'The Conservation of Habitats and Species Regulations 2017 (the Habitat Regulations). HMSO, London'. Available at: https://www.legislation.gov.uk/uksi/2017/1012/contents/made

Ref 6.18: HMSO. (2021). 'The Environment Act. HMSO, London'. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

Ref 6.19: HMSO. (1948). 'National Parks and Access to the Countryside Act. HMSO, London'. Available at: https://www.legislation.gov.uk/ukpga/Geo6/12-13-14/97

Ref 6.20: HMSO. (1975). 'The Salmon and Freshwater Fisheries Act, HMSO, London'. Available at: https://www.legislation.gov.uk/ukpga/1975/51

Ref 6.21: HMSO. (2009). 'The Eels (England and Wales) Regulations, HMSO, London'. Available at: https://www.legislation.gov.uk/uksi/2009/3344/contents/made

Ref 6.22: Ministry of Housing, Communities and Local Government and Department for Levelling Up, Housing and Communities. (2021). 'Planning Practice Guidance'. Available at: https://www.gov.uk/government/collections/planning-practice-guidance

Ref 6.23: CIEEM. (2017a). 'Guidelines for Preliminary Ecological Appraisal. CIEEM, Winchester. AND CIEEM (2017b)'. Guidelines for Ecological Report Writing. CIEEM, Winchester. Distane Available at: https://cieem.net/resource/guidance-on-preliminary-ecological-appraisal-gpea/

Ref 6.24: OS OpenData. (2023). Available at: https://www.ordnancesurvey.co.uk/business-government/tools-support/open-data-support.

Ref 6.25: Natural England Open Data Geoportal. (2023). Available at: https://naturalengland-defra.opendata.arcgis.com/

Ref 6.26: Natural England. (2023). 'Multi Agency Geographic Information System Mapping (MAGIC)'. Available at: https://magic.defra.gov.uk/MagicMap.aspx

Ref 6.27: Environment Agency. (2023). 'Ecology and Fish Data Explorer'. Available at: https://defra-ecology-prod.publishmydata.com/ecology-fish/

Ref 6.28: Greenspace Information for Greater London (GiGL). (2022). Available at: https://www.gigl.org.uk/

Ref 6.29: Cory Riverside Energy. (2019). 'Riverside Energy Park Environmental Statement Chapter 11: Terrestrial Biodiversity'. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010093/EN010093-000422-Cory%20Environmental%20Holdings%20Limited%20-%206.1%20ES%20Chapter%2011%20Terrestrial%20Biodiversity%20(Rev%201).pdf

Ref 6.30: Collins J. (ed.). (2016). 'Bat Surveys for Professional Ecologists, Good Practice Guidelines (3rd Edition). The Bat Conservation Trust, London'. Available at: https://www.bats.org.uk/resources/guidance-for-professionals/bat-surveys-for-professional-ecologists-good-practice-guidelines-3rd-edition

Ref 6.31: London Borough of Bexley. (2011). 'Protected species and planning in Bexley'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Protected-species-and-planning-in-Bexley.pdf

Ref 6.32: London Borough of Bexley. (2022). 'Planning – Application Summary, 22/00728/FUL'. Available at: https://pa.bexley.gov.uk/online-applications/caseDetails.do?caseType=Application&keyVal=R95PWABEI2B00

Ref 6.33: Cory Riverside Energy. (2019). 'Riverside Energy Park Outline Biodiversity Landscape Mitigation Strategy'. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010093/EN010093-000919-7.6%20Outline%20Biodiversity%20Landscape%20Mitigation%20Strategy%20(Rev%204).pdf

Ref 6.34: Thames Valley Environmental Records Centre (Undated) Spotlight on. Otter. Available at: https://www.tverc.org/cms/content/spotlight-otter

Ref 6.35: Jacoby, D. & Gollock, M. (2014). *Anguilla anguilla*. 'The International Union for Conservation of Nature Red List of Threatened Species'. Available at: https://www.iucnredlist.org/species/60344/45833138

Ref 6.36: Chadd, R. & Extence, C. (2004). 'The conservation of freshwater macroinvertebrate populations: a community-based classification scheme'. Aquatic Conservation: Marine and Freshwater Ecosystems, 14, 597–624. Available at: https://onlinelibrary.wiley.com/doi/10.1002/aqc.630

Ref 6.37: Moorcroft, M.D. & Speakman, L. (2015). 'Biodiversity Climate Change Impacts Summary Report. Living With Environmental Change, Swindon'. Available at: https://www.ukri.org/wp-content/uploads/2021/12/101221-NERC-LWEC-BiodiversityClimateChangeImpacts-ReportCard2015-English.pdf

Ref 6.38: The Woodland Trust. (2021). 'State of the UK's Woods and Trees 2021'. https://www.woodlandtrust.org.uk/media/51705/state-of-the-uks-woods-and-trees-2021-thewoodlandtrust.pdf

Ref 6.39: British Trust for Ornithology. (2019). 'Bird Indicators'. Available at: https://www.bto.org/our-science/publications/developing-bird-indicators

Ref 6.40: State of Nature Report. (2019). https://nbn.org.uk/wp-content/uploads/2019/09/State-of-Nature-2019-UK-full-report.pdf

Ref 6.41: British Trust for Ornithology. (2011). 'BTO Research Report No.572: An examination of reptile and amphibian populations in gardens, the factors influencing garden use and the role of a 'Citizen Science' approach for monitoring their populations within this habitat'. Available at: https://www.bto.org/sites/default/files/shared_documents/publications/research-reports/2010/rr572.pdf

Ref 6.42: Mather-Gratton, Z. (2022). 'The effect of the climate crisis on UK reptile populations, Froglife'. Available at: https://www.froglife.org/2021/02/22/the-effect-of-the-climate-crisis-on-uk-reptile-populations/

Ref 6.43: London Wildlife Trust, Stag Beetle Campaign. Available at: https://www.wildlondon.org.uk/campaign/record-your-sightings/stag-beetle-campaign#:~:text=The%20decline%20in%20stag%20beetle,for%20their%20larvae%20to%20grow

Ref 6.44: Strachan, R. (2003). 'The Water Vole in Britain 1996-1998, The Vincent Wildlife Trust'. Available at: https://www.vwt.org.uk/publications/the-water-vole-and-mink-survey-of-britain-1996-1998-with-a-history-of-the-long-term-changes-in-the-status-of-both-species-and-their-causes-3/

Ref 6.45: ZSL. (2021). 'The State of the Thames 2021: Environmental Trends of the Tidal Thames'. Available at: https://membership.zsl.org/sites/default/files/ZSL_TheStateoftheThamesReport_Nov2021.pdf

Ref 6.46: Peak District National Park Authority. (2021). 'Climate Change Vulnerability Assessment. Feature Assessment: Wildlife / Aquatic invertebrates'. Available at: https://reports.peakdistrict.gov.uk/ccva/docs/assessments/wildlife/aquaticinvertebrates.html

Ref 6.47: Lind, L., Lutz Eckstein, R., & Relyea, R.A. (2022). 'Direct and indirect effects of climate change on distribution and community composition of macrophytes in lentic systems'. Biological Reviews, 97: 4, 1677-1690. Available at: https://onlinelibrary.wiley.com/doi/full/10.1111/brv.12858

Ref 6.48: CIEEM. (2018). 'Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine'. Available at: https://cieem.net/resource/guidelines-for-ecological-impact-assessment-ecia/

Ref 6.49: Highways Agency. (2019). 'Design Manual for Roads and Bridges, LA 104 Environmental assessment and monitoring'. Available at: https://www.standardsforhighways.co.uk/dmrb/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a

7. MARINE BIODIVERSITY

7.1. INTRODUCTION

7.1.1. This chapter considers the impacts of the Proposed Scheme on marine biodiversity during construction and operation, and any potential significant effects. It sets out the proposed methodology for the marine biodiversity assessment and impacts that can be scoped out of the assessment. Where necessary further assessment will be presented in the ES.

7.2. POLICY, LEGISLATION, AND GUIDANCE

7.2.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is detailed in **Table 7.1**.

Table 7-1: Marine Biodiversity – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011 (Ref 7.1)	Sets out the Government's policy for delivery of major energy infrastructure and will be the primary basis for decision making. NPS EN-1 contains the following policy statements which are considered to be of key relevance for the purpose of the assessment of environmental impacts on marine biodiversity 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). • *"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 / 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*

Policy / Legislation / Guidance	Description
	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). *"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 for Energy EN-1 2021 (Ref 7.2)	The Government has published a draft update to the Overarching National Policy Statement for Energy. Section 4.4 highlights 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. 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 / Guidance	Description
	Applicants for a development consent order will need to take account of any relevant Marine Plans. There is an expectation that applicants will complete a Marine Plan assessment as part of their project development and this information should be used to support an application for development consent. Applicants are encouraged to refer to Marine Plans at an early stage, such as in advance of pre-application stage, to inform project planning, for example to avoid less favourable locations as a result of other uses or environmental constraints. Section 4.5 highlights the requirements for environmental and biodiversity net gain. Environmental net gain is an approach to development that aims to leave the natural environment in a measurably better state than beforehand. Applicants should therefore not just look to mitigate direct harms, but also consider whether there are opportunities for enhancements. Biodiversity net gain is an essential component of environmental net gain. Projects 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 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. Applicants are encouraged to use the most current version of the Defra biodiversity metric to calculate their biodiversity baseline and inform their biodiversity net gain outcomes and to present this data as part of their application. Biodiversity net gain should be applied in conjunction with the mitigation hierarchy and does not change or replace existing environmental obligations.

Policy / Legislation / Guidance	Description
	In addition to delivering biodiversity net gain, developments may also deliver wider environmental gains relevant to the local area, and to national policy priorities, such as reductions in GHG emissions, reduced flood risk, improvements to air or water quality, or increased access to natural greenspace. The scope of potential gains will be dependent on the type, scale, and location of specific projects. Applications for development consent should be accompanied by a statement demonstrating how opportunities for delivering wider environmental net gains have been considered, and where appropriate, incorporated into the design (including any relevant operational aspects) of the project. Applicants should make use of available guidance and tools for measuring natural capital assets and ecosystem services, such as the Natural Capitals committee's 'How to Do it: natural capital workbook' and Defra's guidance on Enabling a Natural Capital Approach (ENCA). Where environmental net gain considerations have featured as part of the strategic options appraisal process to select a project, the statement should reference that information to supplement the site-specific details.
The National Planning Policy Framework (NPPF) 2021 (Ref 7.3)	Presents the Government's planning policies for England and how these are expected to be applied. The following paragraphs relate to marine biodiversity. Section 15 of the framework 'Conserving and enhancing the natural environment' incorporates policies requiring that development impacts on both terrestrial and marine biodiversity are minimised. Section 15 Paragraph 174 states that "*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*

Policy / Legislation / Guidance	Description
	status or identified quality in the development plan); *(b) Recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services- including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland.* *(c) Maintaining the character of the undeveloped coast, while improving public access to it where appropriate;* *(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, 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".*
The London Plan 2021 (Ref 7.4)	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, SI 14 & SI17 of the London plan are the Key policies specific to marine biodiversity within Greater London that states: • Policy G1: Green Infrastructure – *"…Green infrastructure should be planned, designed and managed in an integrated way to achieve multiple benefits. Boroughs should prepare*

Policy / Legislation / Guidance	Description
	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 SI 14: Waterways - strategic role – "*Development Plans and development proposals should address the 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 SI 17: Protecting and enhancing London's waterways – "*Development Plans should support river restoration and biodiversity improvements….Development proposals along*

Policy / Legislation / Guidance	Description
	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."
London Borough of Bexley Unitary Development Plan 2004 – 'Saved' Policies (Ref 7.5)	The main purpose of the Unitary Development Plan is to provide a framework for guiding development, and to show how land will be used as a resource for achieving the Council's wider objectives. The following policies relate to marine biodiversity: • ENV28: Within LNRs *"development will be resisted that would endanger the preservation of those special characteristics that lead to designation."* • ENV32: *"Development will not be permitted within Sites of Special Scientific Interest…unless it can be shown that there would be no damage to scientific or nature conservation interests."* • ENV33: *"Development of land adjoining Sites of Special Scientific Interest will be resisted unless it can be shown that there would be no damage to scientific or nature conservation interests."* • ENV46: *"Any new development…within conservation areas should preserve or enhance the character or appearance of the area."* • TS15: *"The council will promote the protection of wildlife and the improvement for wildlife of the river and of habitats on Thames-side, including its adjacent minor watercourses and dikes. Development that diminishes these habitats will be resisted".*
London Borough of Bexley Core Strategy (2012) (Ref 7.6)	The Core Strategy sets out the Council's long-term vision for development in the borough. It aims to support a strong, sustainable and cohesive

Policy / Legislation / Guidance	Description
	community. The following policies of the Core Strategy relate to marine biodiversity: • CS01: Achieving Sustainable Development – *"protecting designated areas, such as metropolitan green belt, from inappropriate development so as to preserve, enhance and promote Bexley's network of open spaces and waterways, heritage, biodiversity and geological assets".* • CS09: Using Bexley's Resources Sustainably – *"working with partners to make sure any leisure, transport, freight or development activities on and adjacent to the River Thames and other riverside areas are not detrimental to the quality of the environment in those areas".* • CS17: Green Infrastructure – *"protecting and enhancing the biodiversity, heritage and archaeological values of open spaces, including the Rivers Thames, Cray, Shuttle and their tributaries within the borough; protecting significant green corridors, and seeking opportunities to increase connectivity between the network of green spaces and habitats".* • CS18: Biodiversity and Geology – *"protecting, conserving and enhancing Bexley's Sites of Special Scientific Interest (SSSI) and Sites of Importance for Nature Conservation (SINC); resisting development that will have a significant impact on the population or conservation status of protected species and priority species as identified in the UK, London and Bexley Biodiversity Action Plans; protecting and enhancing the natural habitat as far as practicable, seeking biodiversity enhancements and improved access to nature".*
The UK post-2010 Biodiversity Framework 2011-2020 (2012) (Ref 7.7)	The 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 and its five strategic goals and 20 'Aichi Targets'. The

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	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 the country biodiversity strategies, and where work in the country strategies contributes to international obligations. With reference to marine biodiversity, Atlantic salmon *Salmo salar*, brown trout *Salmo trutta*, European eel *Anguilla anguilla,* river lamprey *Lampetra fluviatilis*, and white-clawed crayfish *Austropotamobius pallipes* are listed as priority species in the Framework.
Bexley Biodiversity Action Plan (BAP) 2011 (Ref 7.8)	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.
London Borough of Bexley Draft Local Plan (2021) (Ref 7.9)	The new Local Plan is awaiting adoption and will then replace the Bexley Core Strategy and Saved UDP policies 2012. It contains a number of policies relating to biodiversity within the borough including: • 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 • DP20: Biodiversity and Geodiversity in Developments – which set out a number of issues proposed developments 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*

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	designated for its nature conservation or geological interest should protect and enhance the designated site's value, and will not be permitted unless all of the following criteria are met: *a) there are no reasonable, less damaging, alternative solutions, locations or sites;* *b) ecological buffer zones have been incorporated into the scheme, where appropriate, to protect and enhance the designated site's intrinsic value;* *c) the continuity of wildlife habitat within wildlife corridors is maintained; and* *d) access to the designated site is not compromised and where possible, access and/or interpretation is improved".*
Legislation	
The Wildlife and Countryside Act 1981 (as amended) (WCA) (Ref 7.10)	This is 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.

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The Natural Environment and Rural Communities (NERC) Act 2006 (Ref 7.11)	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*". 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 Regulations 2017 (as amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019) ('the Habitats Regulations') 2017 (Ref 7.12)	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);* and • *"is not directly connected with or necessary to the management of that site must make an appropriate assessment of the implications of*

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	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 Secretary of State (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 negatively impact a European Site, Regulation 64 of the Habitats Regulations provides that the competent authority may agree to the plan or project notwithstanding that negative 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 negative 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 negatively impacted hosts a priority natural habitat type[8] 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[9]".* In addition, Regulation 55 requires "*Licences for certain activities relating to animals or plants*",

[8] See Article 1(d) of EC Directive 92/43/EEC.
[9] See Article 1(h) of EC Directive 92/43/EEC.

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	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 (see **Chapter 6: Terrestrial Biodiversity**) 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 (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. 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 (**Ref 7.1**).
The Convention on the Conservation of European Wildlife and Natural Habitats 1979 (the 'Bern Convention') (Ref 7.13)	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 (**Ref 7.9**).
Salmon and Freshwater Fisheries Act 1975 (SAFFA) (Ref 7.14)	The Salmon and Freshwater Fisheries Act 1975 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).

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	Under this Act any person who causes or knowingly permits for liquid or solid matter to enter any waters (and/or tributaries of waters) 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 also 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 (Ref 7.15)	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 *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	The Water Framework Directive (WFD) (2000/60/EC) establishes a framework for the

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Directive) (England and Wales) Regulations (the 'Water Framework Regulations') 2017 (Ref 7.16)	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 a number of '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. 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

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	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 (Ref 7.17)	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) (Ref 7.18)	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

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	biodiversity in need of protection in 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 inter alia 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* 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 Thames River Basin Action Plan (Ref 7.19)	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.
The Marine and Coastal Access Act 2009 (Ref 7.20)	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 136 of the Marine and Coastal Access Act places specific duties on the MMO relating to MCZs and marine license decision making. Section 126 applies where:- *(a) "a public authority has the function of determining an application (whenever made) for authorisation of the doing of an act, and* *(b) The act is capable of affecting (other than insignificantly) -* *(i) the protected features of an MCZ;*

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	(ii) 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 License 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: • *"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)".* 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.
The Environment Act 2021 (Ref 7.21)	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

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	metric published by the secretary of state and a 10% gain will be mandatory. The Act includes this requirement for NSIPs, being secured under Section 99 and Schedule 15. It is expected that the mandatory requirement for a 10% gain will come into force in 2023.
Guidance	
National Planning Practice Guidance (2021) (Ref 7.22)	Explains the processes and tools that can be used through the planning system in England. It also provides guidance on preserving and enhancing the natural environment. Paragraph 174. Planning policies and decisions should contribute to and enhance the natural and local environment by: "*c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate*; *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, 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*". Paragraph 179. To protect and enhance biodiversity and geodiversity, plans should: "*a) Identify, map and safeguard components of local wildlife-rich habitats and wider ecological*

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	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 *b) 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: "*a) 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;* *d) 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*".

7.3. BASELINE CONDITIONS AND FUTURE BASELINE

7.3.1. The key sources of information on baseline marine biodiversity conditions will be:

- Natural England's MAGIC map application (**Ref 7.23**);
- Open source 1:25,000 Ordnance Survey datasets (**Ref 7.24**);
- The Rivers Trust River Obstacles map application (**Ref 7.25**);
- Environment Agency (EA) Catchment Data Explorer (**Ref 7.26**);
- EA Ecology and Fish Data Explorer (**Ref 7.27**);
- Estuaries Edges Case Studies (**Ref 7.28**);
- Zoological Society of London (ZSL) and Thames Ecology Research Programme resources (**Ref 7.29 – 7.37**);
- EA Water Quality Archives (**Ref 7.38**);
- London Borough of Bexley (LBB) Sites of Importance for Nature Conservation Report (**Ref 7.39**);
- Available grey literature and technical reports for projects on the Thames (**Ref 7.40 – Ref 7.54**);
- International Union for Conservation of Nature (IUCN) Red List (**Ref 7.55**); and
- Site walkovers and surveys undertaken.

7.3.2. A short summary of the baseline conditions are presented below.

7.3.3. The information gathered and presented within the ES for Riverside 2 will inform the baseline relevant to marine biodiversity, where relevant.

DESIGNATED SITES

7.3.4. Designated sites have been considered if they include features relating to marine biodiversity, including marine habitats and species.

7.3.5. Records have been obtained for designated sites within 15km of the Site Boundary, as direct and indirect impacts from the Proposed Scheme are unlikely to extend beyond this area. However, this distance has been extended accordingly if a direct and functional hydrological connection to the Site Boundary and/or Study Area is present. Hydrological connectivity was determined using Ordnance Survey maps, aerial photographs, and the River Obstacle map application (**Ref 7.25**).

7.3.6. A summary of the designated sites relevant to marine biodiversity is provided below.

Internationally Designated Sites

7.3.7. No internationally designated sites have been identified within 15km of the Site Boundary.

7.3.8. Internationally designated sites with functional hydrological links to the Site Boundary include:

- Thames Estuary and Marshes Ramsar (approximately 18.6km east of the Site Boundary);

- Medway Estuary and Marshes Ramsar (approximately 28.4km southeast of the Site Boundary);
- Benfleet and Southend Marshes Ramsar (approximately 28.6km east of the Site Boundary);
- Foulness (Mid-Essex Coast) Ramsar (approximately 42.9km east of the Site Boundary); and
- The Swale Ramsar (approximately 41km southeast of the Site Boundary).

Nationally Designated Sites

7.3.9. The desk study research identified three statutory designated sites within 10km of the Site Boundary, as detailed in **Table 7-2**.

Table 7-2: Nationally Designated Sites within 10km of the Site Boundary

Designated Site	National Designation(s)	Approximate Distance from Site Boundary	Description
Inner Thames Marshes	SSSI	0.9km east	An area of wetland and grazing marsh at the upper reaches of the Thames Estuary. Supports diverse ornithological features (includes wintering teal populations reaching levels of international importance), as well as national/regionally scarce plant and invertebrate species.
West Thurrock Lagoon & Marshes	SSSI	8km southeast	Area of lagoon, marshes and intertidal mudflats that is an important site for wintering waders and waterfowl (including locally important numbers of Teal *Anas crecca*, Snipe *Gallinago gallinago* and Grey Heron *Ardea cinerea*). Site also contains Stone Ness saltings, which constitutes the largest area of saltmarsh in the inner Thames estuary.

Designated Site	National Designation(s)	Approximate Distance from Site Boundary	Description
Swanscombe	MCZ	9.2km southeast	Important area of the Thames Estuary. The MCZ is designated for intertidal mud habitat and the tentacled lagoon worm *Alkamaria romijni*.

7.3.10. Nationally designated sites, beyond 10km, that list marine features as a reason for their designation and have functional hydrological links to the Site Boundary are:

- Swanscombe Peninsula SSSI (approximately 10.4km southeast of the Site Boundary);
- South Thames Estuary and Marshes SSSI (approximately 18km southeast of the Site Boundary);
- Mucking Flats and Marshes SSSI (approximately 19.1km southeast of the Site Boundary);
- Holehaven Creek SSSI (approximately 23.8km east);
- Medway Estuary MCZ Zone 1 & 2 (approximately 25km southeast of the Site Boundary);
- Medway Estuary and Marshes SSSI (approximately 28.5km southeast of the Site Boundary);
- Benfleet and Southend Marshes SSSI (approximately 28km east of the Site Boundary);
- The Swale Estuary MCZ (approximately 39.7km southeast of the Site Boundary);
- The Swale SSSI (approximately 40km southeast of the Site Boundary); and
- Foulness SSSI (approximately 42.9km east of the Site Boundary).

Non-statutory Designated Sites

7.3.11. The Site Boundary directly overlaps with The River Thames and its Tidal Tributaries Site of Importance for Nature Conservation (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 which border the Thames. It recognises a range of estuarine habitats including mud flat, shingle beach, saltmarsh, reedbeds and the river channel (**Ref 7.39**). Similarly, the LBB Local Biodiversity Action Plan (LBAP) includes rivers and streams as a priority habitat (**Ref 7.8**).

7.3.12. There are no further non-statutory designated sites within 10km relevant to marine biodiversity.

WATER FRAMEWORK DIRECTIVE

WFD-Designated Water Bodies

7.3.13. There is one WFD-designated water body located within the Study Area, the Thames Middle Water Body (GB530603911402). Alongside the main Thames channel, the Thames Middle Water Body also includes the tidal sections of a number of Thames tributaries, including the River Roding, River Lea (Lee), Deptford Creek and River Darent. Any reference to the Thames Middle within this Scoping Report is inclusive of the tidal section of these watercourses.

7.3.14. 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 7-3** (**Ref 7.26**).

Table 7-3: 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
Infaunal Quality Index (Sub Element)	Good
Macroalgae	Good
Fucoid Extent (Sub Element)	Good
Opportunistic Algae (Sub Element)	High
Phytoplankton	Good

7.3.15. 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 Boundary (**Ref 7.23**).

7.3.16. An overview of the habitats and species within the Thames Middle Water Body is provided below.

Thames Middle Water Body

Marine Habitats

7.3.17. 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 WIMS database monitoring station: Thames at Erith) (**Ref 7.38**).

7.3.18. The subtidal substrate within the Thames Middle Water Body is predominantly coarse sediment, sand and mud (**Ref 7.39**).

7.3.19. 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. These mudflats are up to 2km wide in the Outer Estuary, however the mudflat fringes become narrower further inland (**Ref 7.39**).

7.3.20. DEFRA's Magic mapping application 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) (**Ref 7.23**).

7.3.21. 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. It is also included in the OSPAR Convention as a threatened and/or declining habitat and is also listed on the Habitat Regulations.

7.3.22. A site visit was undertaken on the 4th November 2022 to determine the habitats present within the Study Area (described in **Section 7.4**). 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 constructed 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. A number of marine algae and salt tolerant plants were observed during the site visit, these are discussed further in **Paragraph 7.3.31** of this Report.

Subtidal Benthic Communities

7.3.23. The invertebrate species commonly found in brackish subtidal sections of the Thames Middle Water Body (where the Study Area is located) includes the amphipod *Gammarus zaddachi*, the oligochaete *Tubifex tubifex* and a non-native mollusc *Potamopyrgus antipodarum* (**Ref 7.41**).

7.3.24. 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 (**Ref 7.41; Ref 7.42**).

7.3.25. 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 (**Ref 7.41**). 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.

7.3.26. Subtidal benthic communities at Gallions Reach, approximately 4km upstream from the Site Boundary, were found to support Trembling sea mat *Victorella* sp (**Ref 7.43**). This nationally rare bryzoan is protected under Schedule 5 of the WCA and as a Species of Principal Importance (SPI) under Section 42 of the NERC Act. It is also listed in the UK BAP as a priority species. Sea mat *Einhornia crustulenta*, which is a nationally rare species (**Ref 7.44**), was also present.

7.3.27. *Victorella sp* was also detected in 2012 at an Environment Agency Transitional and Coastal (TraC) benthic invertebrate monitoring site (**Ref 7.27**), located approximately 8km downstream of the Site Boundary.

7.3.28. 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 (**Ref 7.45** and **Ref 7.46**). Therefore, macrofaunal communities could show significant variation within the Study Area compared to the rest of the Thames Middle Water Body.

Intertidal Benthic Communities

7.3.29. 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 sp* and the spionidae *Streblospio shrubsolii*) and tubificid oligiochaetes such as the marine worm *Limnodrilus hoffmeisteri* (**Ref 7.29**).

7.3.30. The macrofaunal community in the intertidal habitats at Thames Wharf (9km upstream of the Site Boundary) was surveyed in 2015 (**Ref 7.47** and **Ref 7.48**). The communities were highly impoverished with low species diversity. The assemblage featured oligochaetes, nemotodes 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.

7.3.31. The Crossness Sewage Treatment Works is located approximately 230m to the east of the Site Boundary (with a discharging outfall and storm drain) (**Ref 7.49**), and therefore it is likely that the marine worm *L. hoffmeisteri* will be present in high abundance within the Site Boundary.

7.3.32. The macrofaunal community recorded in 2015, at an Environment Agency TraC invertebrate monitoring site (**Ref 7.6**) 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.

7.3.33. 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 and is nationally scarce, being recorded in only 27 sites in the UK (**Ref 7.10**).

Phytoplankton

7.3.34. EA TraC phytoplankton monitoring data for the Thames Middle Water Body was available from surveys conducted in 2019 one survey location was within the Site Boundary (**Ref 7.27**). The assemblage was predominantly diatoms and protozoans, with no Invasive Non-Native Species (INNS) detected.

Marine Plants and Macroalgae

7.3.35. A macroalgae survey was conducted in 2020 for the Thames Middle Water Body approximately 2km upstream from the Site Boundary (**Ref 7.37**). 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 and both species were detected growing on hard substrate.

7.3.36. The site visit undertaken on the 4th of November 2022 determined the composition of marine plants and algae. 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.

Fish

7.3.37. The Thames Estuary supports diverse fish fauna, with over 115 species recorded in Environment Agency fish surveys (**Ref 7.29**). The Thames Estuary is commonly split into the inner, middle and outer. The Site Boundary is located in the inner Thames Estuary.

7.3.38. 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.

7.3.39. A summary of regulations relevant to protected/notable fish species within the inner Thames Estuary, and their habitat preference, is summarised in **Table 7-4**. 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 Site Boundary.

7.3.40. Recent catch data from Environment Agency TraC monitoring surveys (4th November 2022) is presented in **Table 7-5**.

7.3.41. Elasmobranch have also been recorded in the Thames Estuary and are discussed independently in Paragraphs 7.3.47 and 7.3.48 below.

Demersal

7.3.42. The Thames Estuary provides a spawning and nursery grounds for several demersal species, including cod, whiting *Merlangus merlangus*, plaice *Pleuronectes platessa* and flounder *Platichthys flesus* (**Ref 7.50**). 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.

7.3.43. EA TraC fish monitoring surveys are regularly conducted at Woolwich, approximately 5km upstream of the Site Boundary (**Ref 7.27**). Three sites were surveyed in 2022 with ten species recorded (**Table 7-5**). 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*. Pouting *Trisopterus luscus* and European smelt.

7.3.44. Dover sole, whiting and sand goby are afforded legislative protection (**Table 7-4**). Dover sole is also a commercially important species.

7.3.45. Short-snouted seahorse *Hippocampus hippocampus* has also been detected in Environment Agency TraC data for the middle Thames Estuary in 2011 and 2017 (**Ref 7.27** and **Ref 7.29**). This species is also afforded legislative protection (**Table 7-4**).

Pelagic

7.3.46. Pelagic marine species are commonly found in the Thames Estuary, often utilising the Thames Estuary for spawning and nursery grounds (**Ref 7.50**).

7.3.47. Sea bass *Dicentrarchus labrax* and herring *Clupea harengus* were recorded at the Woolwich Environment Agency TraC fish monitoring location in 2022, in low abundance (**Table 7.27**).

7.3.48. The Thames Estuary is an important spawning ground for herring (**Ref 7.50**), which is a protected species (**Table 7-4**). However, no spawning grounds have been recorded as far inland as the Site Boundary and the salinity levels are likely at the lower limit considered suitable for herring spawning (**Ref 7.51**).

Migratory

7.3.49. 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 7-4**).

7.3.50. The Thames Estuary supports nationally important populations of European smelt (**Ref 7.27** and **Ref 7.29**). This species was recorded at the Woolwich Environment Agency TraC fish monitoring location in 2022 (**Table 7-5**), with evidence that there is

a spawning site located near Greenwich (approximately 10km upstream of the Site Boundary) (**Ref 7.30**).

7.3.51. 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 (**Ref 7.27**). Additionally, freshwater fish surveys and monitoring programmes have recorded European eel in the River Roding (**Ref 7.27** and **Ref 7.31**) which joins the Thames approximately 4km upstream from the Site Boundary. This demonstrates that eels are migrating through this section of the Thames.

7.3.52. 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 Boundary (**Ref 7.27**). However, the absence of protected/notable species in surveys does not preclude their presence, as survey methodology and timing can impact catch return. Therefore, a precautionary principle will be applied, with species assumed to be present if suitable habitat is available within the Site Boundary, or if the Site Boundary is located within a species migratory corridor.

Elasmobranchs

7.3.53. 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* (**Ref 7.29 and Ref 7.31**).

7.3.54. 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 7.4**). No elasmobranch species have been recorded in recent fish monitoring within the Study Area (**Ref 7.27**).

Table 7-4: Protected Fish Species Present within the Thames Estuary (Ref 7.27; Ref 7.28; Ref 7.32)

Common Name	Latin Name	Habitat Preference[10]	IUCN Red List[11]	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		✓					✓

[10] D = Demersal, M = Marine, F = Freshwater and P = Pelagic.
[11] VU = Vulnerable, LC = Least Concern, DD = Data Deficient, CR = Critically Endangered.

Common Name	Latin Name	Habitat Preference[10]	IUCN Red List[11]	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	✓			✓		✓
River lamprey	*Lampetra fluviatilis*	M	LC		✓	Annex III	Annex II, V		✓	✓
Sand goby	*Pomatoschistus minutus*	D	LC			Annex III				

Common Name	Latin Name	Habitat Preference[10]	IUCN Red List[11]	WCA	NERC SPI	Bern Convention Protected Fauna	Habitat Directive	MCZ Species Features of Conservation Importance	LBAP Priority Species	UK BAP Priority Species
Short-snouted seahorse	*Hippocampus hippocampus*	D	DD	Schedule 5	✓	Annex II		✓		✓
Twaite shad	*Alosa fallax*	M	LC	Schedule 5	✓	Annex II, V			✓	✓
Whiting	*Merlangius merlangus*	D	LC		✓					✓

Table 7-5: Environment Agency TraC Fish Survey Data (Woolwich 4-11-2022) (Ref 7.27)

Common Name	Latin Name	Site 1 (TQ 44683 80971)[12]	Site 2 (TQ 44679 80921)[13]	Site 3 (TQ 45430 81420)[14]
		(Number of Species)		
Red Gurnard	*Aspitrigla cuculus*	1	1	-
Red mullet	*Mullus surmuletus*	2	-	-
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
Whiting	*Merlangius merlangus*	95	19	44
Flounder	*Platichthys flesus*	99	23	7
Sea bass	*Dicentrarchus labrax*	1	1	3
Herring	*Clupea harengus*	-	-	10

[12] Site 1 (TQ 44683 80971) is located approximately 4.75km upstream of the Site Boundary.
[13] Site 2 (TQ 44679 80921) is located approximately 4.75km upstream of the Site Boundary.
[14] Site 3 (TQ 45430 81420) is approximately 4km upstream of the Site Boundary.

Marine Mammals

Pinnipeds

7.3.55. 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 as a whole (**Ref 7.52**). There are records of both species in the vicinity of the Site Boundary (foraging and as a migration corridor).

7.3.56. 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 Bexley and Greenwich area and have been reported as far inland as Teddington (**Ref 7.34** and **Ref 7.35**). Grey and harbour seals have historically been recorded, within and upstream of the Site Boundary by ZSL surveys since 2004 (**Ref 7.34**). 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 (**Ref 7.34**).

7.3.57. Both species are protected under the Conservation of Seals Act 1970, the WCA and are listed in Annex II of the EC Habitats Directive. 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

7.3.58. 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) (**Ref 7.53**)

7.3.59. This species is observed in high densities in the outer Thames Estuary; however, individuals have been observed in the vicinity of the Site Boundary, being reported as far inland as Richmond (**Ref 7.35**).

7.3.60. The species is protected under The Marine and Coastal Access Act 2009 and the WCA. It is also listed under CITES Appendix II and Annex II of the EC Habitats Directive, 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 and the Agreement on the Conservation of Small Cetaceans in the Baltic, North-East Atlantic, Irish and North Seas (ASCOBANS).

Other Cetaceans

7.3.61. Several cetacean species migrate past the Thames Estuary in the North Sea, and occasionally individuals will enter the Thames Estuary. In the last 10 years, the following species have been observed (**Ref 7.54**):

- Northern minke whale *Balaenoptera acutorostrata*;
- Humpback whale *Megaptera novaeangliae*;
- Sei whale *Balaenoptera borealis*; and

- Beluga whale *Delphinapterus leucas*.

7.3.62. Very rarely have individuals from these species reached locations as far inland as the Site Boundary, as shallow depths of the estuary prevent access for larger species. Therefore, it is unlikely that these species will be present within the Site Boundary.

7.3.63. Dolphins have been occasionally observed in the Thames Estuary, with reports of sightings as far inland as Richmond. However, dolphins are not frequently present within the vicinity of the Site Boundary (**Ref 7.35**).

Invasive Non-Native Species

7.3.64. INNS are widespread throughout the Thames Estuary, with many species becoming well established. This includes (**Ref 7.36**).

- 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*.

7.3.65. Many of these species have been detected at Environment Agency TraC monitoring sites both upstream and downstream of the Site Boundary and are likely to be present within the Site Boundary.

FUTURE BASELINE

Overview

7.3.66. Climate change is the single most prevalent factor when attempting to predict the future baseline of an ecosystem or species community. 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.

7.3.67. With regards to the key marine biodiversity features known to be present within the Site Boundary (as described in the section above), it is difficult to predict with considerable confidence as to their likely response to climatic change. However, the following section presents known information on the medium and long-term trends in distribution and abundance for such features.

7.3.68. The future baseline assumes that existing commercial business within the Site Boundary 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.

Marine Habitats

7.3.69. Coastal squeeze occurs when man-made structures or human activities prevents 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.

Benthic Communities (subtidal and intertidal)

7.3.70. 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

7.3.71. 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

7.3.72. 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

7.3.73. 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

7.3.74. 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.

7.4. STUDY AREA

7.4.1. For the assessment of impacts during both construction and operation phases, the Study Areas for potential sensitive receptors are set out in **Table 7-6.**

7.4.2. The assessment will consider the likely effects of the Proposed Scheme on ecological features within Proposed Scheme's Zone of Influence (ZOI) The ZOI is the area over which ecological features may receive impacts from the Proposed Scheme, ZOI is term used in CIEEM Guidance (**Ref 7.56**) which has been used in this chapter rather than Study Area. It covers the Site Boundary, and the wider landscape where pathways exist for the transfer of impacts away from the Site Boundary, which is outlined in **Table 7-6**.

7.4.3. The sensitivity of ecological features present is also taken into account when determining the ZOI. The Proposed Scheme's ZOI has been determined by:

- consideration of the activities during construction and operation associated with the Proposed Scheme and the scale of the works;
- the duration and timing of the works; and
- ecological data, including the use of online inventories of designated sites and habitats and OS mapping, records of protected and notable species, and findings from field survey work.

Table 7-6: Marine Biodiversity Zone of Influence

Receptor	Potential Zone of Influence
Internationally Designated Sites (SAC/SPA/Ramsar)	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.
National Designated Sites (SSSI/MCZ)	Within 10km 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
Habitats	Within 250m of the Site Boundary.

Receptor	Potential Zone of Influence
Subtidal Benthic Communities	Within 250m of the Site Boundary.
Intertidal Benthic Communities	Within 250m of the Site Boundary.
Marine Plants and Macroalgae	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.

7.5. SENSITIVE RECEPTORS / RESOURCES

7.5.1. The following likely sensitive receptors have been identified (see also further discussion in section 7.7.3 below):

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

- subtidal benthic communities;
- intertidal benthic communities;
- marine plants and macroalgae;
- fish;
- marine mammals (including grey seals, harbour seals and harbour porpoises); and
- INNS.

7.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

7.6.1. In the first instance, adverse impacts on marine biodiversity features during the Proposed Scheme's construction and operation will be avoided and important marine biodiversity features retained wherever possible.

CONSTRUCTION PHASE

7.6.2. Relevant design, mitigation and enhancement measures will be fully discussed within the ES, however they may include and are not limited to:

- Minimised construction footprint to reduce/avoid potential habitat loss. Includes the jetty extension and dredged area;
- Implementation of a Code of Construction Practice (CoCP);
- Adherence to relevant Environmental Permits, Best Practice Guidance and Regulations, British Standards, and monitoring for the protection of marine biodiversity features;
- Implementation of industry standard best practice methods and procedures to ensure water quality impacts are minimised;
- Timing of works, consideration will be given to undertaking construction activities such as piling and capital dredging outside of sensitive periods for fish species. This includes migration and spawning periods;
- Any construction activity that may cause direct disturbance to the marine environment (such as piling and dredging) should also not commence unless an ECoW is present. This is to ensure sensitive species, notably marine mammals, are absent from the area;
- Piling should utilise a soft start to allow sensitive species to move away from the construction area;
- Implementation of reduced vessel speeds in proximity of piers to reduce potential for vessel strike with marine mammals and potential damage to intertidal habitats from wave wash; and
- 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.

7.6.3. 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 significant adverse effect, compensation measures will be implemented. These will constitute a range of different interventions, depending on the species or habitat. General approach may include habitat creation, including the creation of new areas to replace those that may be lost as a result of the Proposed Scheme. If this is not feasible onsite, potential options may include offsetting or creation of a compensation site.

OPERATION PHASE

7.6.4. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- adherence to relevant Environmental Permits, Best Practice Guidance and Regulations, British Standards, and monitoring for the protection of marine biodiversity features;
- implementation of industry standard methods, best available technology and procedures to ensure water quality impacts are minimised;
- timings of maintenance dredging to avoid the sensitive periods for fish species; and
- limiting the speed of operational vessels to reduce the potential for vessel strike with marine mammals and potential damage to intertidal habitats from wave wash.

7.7. DESCRIPTION OF POTENTIAL FOR SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

7.7.1. The potential likely significant effects associated with the construction phase could include:

- Loss of subtidal and intertidal habitat through construction activities, including dredging and wave wash from increased vessel traffic;
- Changes to habitat quality from wave wash through increased vessel traffic and sedimentation from dredging activity;
- Changes to water quality caused through the release of sediments and sediment bound contaminants during dredging/piling activities;
- Smothering of benthic communities through increased sediment deposition during dredging activities;
- Disturbance to migratory species through light spill during construction activities;
- Disturbance to marine mammals/fish species from noise/vibration during construction activities;
- Risk of vessel strike for marine mammals during construction activities;
- Potential spread of INNS during construction activities through vessel movements;
- Changes in water quality due to disposal of dredged material at offshore disposal site; and
- Smothering of benthic communities due to disposal of dredged material at offshore disposal sites.

OPERATION PHASE

7.7.2. The potential likely significant effects associated with the operation phase could include:

- Long-term loss of subtidal and intertidal habitat from the new footprint of the Proposed Jetty and maintenance dredging;

- Changes to habitat quality from wave wash through increased vessel traffic and sedimentation from maintenance dredging activity;
- Changes to water quality through release of sediment and sediment bound contaminants during dredging activities;
- Noise/vibration disturbance to marine mammals/fish species through maintenance dredging and increased vessel traffic;
- Disturbance to fish species through light pollution from the operational activities of the Proposed Jetty;
- Risk of vessel strike for marine mammals during operational activities;
- Potential spread of INNS during operational activities through vessel movements;
- Changes in water quality due to disposal of dredged material at offshore disposal site; and
- Smothering of benthic communities due to disposal of dredged material at offshore disposal sites.

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

7.7.3. The impacts scoped in or out for marine biodiversity are set out in **Table 7-7** below. As set out in **Section 7.3**, the following sensitive receptors have been scoped out of any further assessment, further detail is provided in **Table 7-7** below:

- Internationally designated sites; none of the sites listed in **paragraph 7.3.7** include mobile aquatic features (i.e. resident and migratory fish/marine mammal species) as reasons for designation. Consequently, due to the distance from the Site Boundary, none of these sites are expected to be affected by the Proposed Scheme;
- Nationally designated sites; with the exception of Medway Estuary MCZ, none of the sites in **Table 7.2** or **paragraph 7.3.7** include mobile aquatic features (i.e. resident and migratory fish/marine mammal species) as reasons for notification. Consequently, due to the distance from the Site Boundary, these sites are not expected to be affected by the Proposed Scheme;
- Impacts from any changes arising from the Proposed Scheme to deposition of airborne contaminants has been scoped out of the assessment due to the likely dilution of any airborne contaminants caused by tidal mixing and the high flow levels in the Thames Middle Water Body;
- Phytoplankton have been scoped out of the assessment due to the short-term impacts from the Proposed Scheme activities (i.e. dredging), current dredging activities and the highly turbid nature of the Thames; and
- Vagrant marine mammal species including northern minke whale, humpback whale, sei whale and beluga whale have been scoped out of the assessment as they are not resident species within the Thames Estuary.

Table 7-7: Marine Biodiversity - Impacts Scoped In or Out of Further Assessment

Impacts	Phase	Scoped In	Scoped Out	Justification
Loss or disturbance of habitat (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	✓		Loss/degradation/disturbance of marine habitat resulting from construction and operational activities has the potential to impact biodiversity within the Site Boundary.
Loss or disturbance of habitat (fish and marine mammals)	Construction and Operation		✓	Loss/degradation/disturbance of marine habitats is expected to be localised. As such, designated sites are not anticipated to be impacted due to distance from the Site Boundary. Additionally, fish and marine mammals are highly mobile, which facilitates relocation/avoidance.
Water quality and release of contaminants (marine habitats, intertidal and subtidal benthic communities, marine plants and macroalgae and fish)	Construction and Operation	✓		Construction and operational activities have the potential to introduce/suspend sediment and toxins, with the potential for both direct and indirect adverse impacts on sensitive receptors. Disposal of dredged arisings could also introduce these issues at the offshore disposal sites.

Impacts	Phase	Scoped In	Scoped Out	Justification
Water quality and release of contaminants (marine mammals)	Construction and Operation		✓	This impact is expected to be localised and temporary and unlikely to produce lethal or sub-lethal effects to marine mammals, as these species are highly mobile and infrequently present within the Site Boundary.
Noise and vibration (fish and marine mammals)	Construction and Operation	✓		Noise and vibration, predominantly from piling (construction) and maintenance dredging (operational) has the potential to have a notable impact on fish and marine mammals.
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		✓	No adverse effects anticipated on these receptors as they are insensitive to noise and vibrations.
Lighting (fish)	Construction and Operation	✓		Artificial lighting during night-time operations has the potential to impact the behaviours of fish, including increased susceptibility to predation.

Impacts	Phase	Scoped In	Scoped Out	Justification
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)	Construction and Operation		✓	Receptors are either insensitive to artificial light, or the impact is too localised and temporary to have a significant adverse effect.
Vessel strikes (marine mammals)	Construction and Operation	✓		Increased vessel traffic has the potential to increase the likelihood of marine mammals being struck. All marine mammal species within the vicinity of the Proposed Scheme are protected under international and national legislation.
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		✓	Receptors are not susceptible to vessel strikes.

Impacts	Phase	Scoped In	Scoped Out	Justification
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)	Construction	✓		Construction activities have the potential to increase suspended sediment concentration in the water column, both at the dredging location and offshore disposal sites, resulting in sessile/low-mobility species being smothered from subsequent sediment deposition. This can cause direct injury/damage or have indirect effects such as reduced growth and reproduction rates. The location for the disposal of dredged arisings (if not reused on site) will be confirmed as the design of the Proposed Scheme progresses. The disposal of dredged arisings at offshore sites could potentially result in the smothering of benthic environments, which can cause direct injury/damage, or have indirect effects such as reduced growth and reproduction rates. As such this will be considered accordingly within the PEIR and the ES.
Changes in suspended sediment concentrations and subsequent sediment deposition on the benthic environment (Medway Estuary MCZ, The River Thames and its Tidal	Operation		✓	Operational maintenance (including dredging, increased boat traffic and berthing) could resuspend sediment that will then settle on benthic environments. However, this increase is assumed to be relatively low and localised; species present within the Site Boundary and immediate surrounds are already climatised

Impacts	Phase	Scoped In	Scoped Out	Justification
Tributaries (SINC), subtidal and intertidal benthic communities, marine plants and macroalgae; fish, marine mammals and INNS)				to existing levels of human activity at the Site due to the presence of Riverside 1 and other industrial facilities (including Riverside 2) within, or in close proximity to, the Site Boundary.
Increased wave wash (Medway Estuary MCZ, The River Thames and its Tidal Tributaries (SINC) and subtidal and intertidal benthic communities)	Construction and Operation	✓		Intertidal saltmarsh is sensitive to increased levels of wave wash, as it can lead to accelerated erosion. This in turn can impact benthic communities that utilise saltmarsh habitat.
Increased wave wash (marine plants and macroalgae, fish, marine mammals and INNS)	Construction and Operation		✓	Increased vessel traffic could result in elevated wave wash, which can be detrimental to marine habitats, and consequently marine plants and macroalgae, fish, marine mammals and INNS. However, the Thames Estuary experiences a high amount of boat traffic, and the additional vessels introduced are highly unlikely to create conditions that are sufficiently more detrimental.
Spread of INNS	Construction and Operation	✓		Vessel movements have the potential to provide a vector for the spread of INNS during construction and operational phase.

7.8. PROPOSED ASSESSMENT METHODOLOGY

DESK-BASED ASSESSMENT

7.8.1. In order to determine the potential impacts of the Proposed Scheme on marine biodiversity, an initial desk study and gap analysis will be undertaken to determine the baseline conditions within the Study Area. The desk study will interrogate a range of freely available resources and scientific and grey literature. An initial gap analysis has identified the requirement for additional baseline surveys to provide site specific baseline conditions.

BASELINE SURVEYS

7.8.2. In order to undertake a full assessment of the likely impacts of the Proposed Scheme on marine biodiversity, a suite of marine surveys have been proposed to further inform the ecological baseline. These surveys include, but are not limited to:

- Intertidal Phase 1 Habitat Survey: Undertaken of the exposed substrate and a seawall survey.
- Intertidal Phase 2 Core/Grab Sampling: This will be undertaken at six locations within the Site Boundary. Three replicates will be taken for biology at each location, along with a sample for particle size and another for sediment chemistry. The biological samples will be analysed for macrofaunal assemblage (e.g. abundance and diversity). The chemical samples will be analysed following the MMO's dredge suite, which includes inorganics (including trace metals: arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc), poly-aromatic hydrocarbons, total petroleum hydrocarbons, organic carbon, polychlorinated biphenyls (PCBs), organochlorines, organotins and brominated flame retardants such as polybrominated diphenyl ethers (PBDEs). Health and Safety risks will be taken into account for working on mudflats and if they are deemed to be of high risk then sampling of the intertidal areas will be instead undertaken from a survey vessel.
- Subtidal Grab Samples: These will be taken at five locations within the Site Boundary. One replicate will be taken for macrofaunal species analysis at each location, with a subsample taken for particle size analysis. A further grab sample will be obtained at each location for sediment chemistry. The biological and chemical sample analysis will be the same as detailed for intertidal surveys.
- Fish Surveys: proposed for two locations within the Site Boundary. Surveys will be undertaken using a 2m beam trawl over a minimum distance of 250m, deployed from a suitable vessel. This approach is subject to regulatory approval.

ASSESSMENT METHODOLOGY

7.8.3. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with LBB, Natural England, Port of London Authority (PLA), MMO and the Environment Agency.

7.8.4. The EIA will be prepared in accordance with the CIEEM's Guidelines on Ecological Impact Assessment (**Ref 7.56**), in addition to the approach detailed in **Chapter 3: EIA Methodology**. Each receptor will be evaluated within the geographic scale of reference and potential effects during the construction and operation phases of the Proposed Scheme.

7.8.5. Based on the likely environment effects set out in **Section 7.7**, the scope of the assessment will include:

- Determine the importance of ecological features affected, through survey and/or research;
- Determine the sensitivity of species/habitats using a desk-based approach;
- Assess impacts potentially affecting important features;
- Characterise the impacts by describing their extent, magnitude, duration, reversibility, timing and frequency;
- Identify the significance of 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 ecological enhancement.

7.8.6. For adverse impacts, CIEEM's Guidelines for Ecological Impact Assessment 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 (**Ref 7.56**). Although the Proposed Scheme does not comprise of a road/bridge which the public has access to, this guidance provides a robust methodology for assessing impacts to marine biodiversity and is considered suitable for this assessment.

7.8.7. This methodology will be used to assess both the construction and operation phases of the Proposed Scheme.

SIGNIFICANCE OF EFFECT CRITERIA

7.8.8. In determining the significance of a potential effect, the magnitude of change arising from the Proposed Scheme is correlated with the value/sensitivity of the particular environmental receptor or process under consideration. The sensitivity of effect criteria will be the same as that detailed in **Chapter 6: Terrestrial Biodiversity** which aligns with CIEEM's Guidelines on Ecological Impact Assessment (**Ref 7.56**). Please see **Chapter 6: Terrestrial Biodiversity** for further details.

7.8.9. Sensitivity of marine species and habitats will be informed using the sensitivity review on the Marine Life Information Network and other scientific literature (**Ref 7.57**).

7.9. ASSESSMENT LIMITATIONS AND ASSUMPTIONS

7.9.1. The following limitations and assumptions have been identified:

- There is limited ecological data available on the marine species that inhabit the Site Boundary. Data has been extracted from nearby Environment Agency monitoring locations and open access reports that likely display similar habitat and species. Benthic ecology sampling and fish surveys have been proposed within the Site Boundary.
- Ecological data is usually valid for 18 months unless otherwise specified. The likelihood of surveys needing to be updated increases with time and is greater for mobile species or in circumstances where the habitat, or its management, has changed significantly since the surveys were undertaken. Factors to be considered include (but are not limited to) whether a site supports, or may support, a mobile species which could have moved on to site or changed its distribution within a site (**Ref 7.58**).
- Survey data will provide a snapshot of the ecological baseline at the time of survey.

7.10. REFERENCES

Ref 7.1: Department for Energy and Climate Change. (2011). 'National Policy Statement EN-1'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 7.2: Department of Energy and Climate Change. (2021). 'Draft Overarching National Policy Statement for Energy (EN-1)'. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf

Ref 7.3: Ministry of Housing, Communities and Local Government. (2018). 'National Planning Policy Framework (NPPF)'. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

Ref 7.4: Greater London Authority. (2021). 'The London Plan, The Spatial Development Strategy for Greater London March 2021'. Available at: https://www.london.gov.uk/programmes-strategies/planning/london-plan/new-london-plan/london-plan-2021

Ref 7.5: Bexley Council. (2004). 'Unitary Development Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-12/Bexley-unitary-development-plan-written-statement-2004.pdf

Ref 7.6: Bexley Borough Council. (2012). 'London Borough of Bexley Core Strategy February 2012'. Available online: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Core-Strategy.pdf

Ref 7.7: JNCC (2012). 'The UK post-2010 Biodiversity Framework 2011-2020 (JNCC and DEFRA)'. Available at: https://hub.jncc.gov.uk/assets/587024ff-864f-4d1d-a669-f38cb448abdc#UK-Post2010-Biodiversity-Framework-2012.pdf.

Ref 7.8: Greater London Borough of Bexley. (2011). 'The Bexley Biodiversity Action Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Biodiversity-Action-Plan-Adopted-June-2011.pdf

Ref 7.9: Bexley Borough Council. (2021). 'London Borough of Bexley Draft Local Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-10/Draft-local-plan-proposed-submission-document-reg-19-may-2021.pdf

Ref 7.10: HMSO. (1981). 'The Wildlife and Countryside Act'. HMSO, Norwich, JNCC and Defra. Available at: http://jncc.defra.gov.uk/page-1377

Ref 7.11: HMSO. (2006). 'Natural Environment and Rural Communities (NERC) Act (2006)'. HMSO, Norwich. Available at: https://www.legislation.gov.uk/ukpga/2006/16/contents

Ref 7.12: HMSO. (2019). 'The Conservation of Habitats and Species Regulations (Amendment) (EU Exit)'. HMSO, Norwich. Available at: https://www.legislation.gov.uk/ukdsi/2019/9780111176573

Ref 7.13: JNCC. (2022). 'Bern Convention'. Available at: https/jncc.gov.uk/our-work/bern convention

Ref 7.14: HMSO. (1975). 'The Salmon and Freshwater Fisheries Act'. HMSO, Norwich. Available at: http://www.legislation.gov.uk/ukpga/1975/51

Ref 7.15: HMSO. (2009). 'The Eels (England and Wales) Regulations'. HMSO, Norwich. Available at: http://www.legislation.gov.uk/uksi/2009/3344/contents/made

Ref 7.16: HMSO. (2017). 'The Water Environment (Water Framework Directive) (England and Wales) Regulations'. HMSO, Norwich. Available at: https://www.legislation.gov.uk/uksi/2017/407/contents/made

Ref 7.17: HMSO. (2021). 'Conservation of Seals Act 1970'. HMSO, Norwich. Available at: https://www.legislation.gov.uk/ukpga/1970/30

Ref 7.18: OSPAR Commission. (2007). 'Convention For The Protection of The Marine Environment of the North-East Atlantic'. Available at: https://www.ospar.org/covention

Ref 7.19: HMSO. (2022). 'Thames River Basin District River Basin Management Plan'. Available at: https://www.gov.uk/guidance/thames-river-basin-district-river-basin-management-plan-updated-2022.

Ref 7.20: HMSO. (2022). 'Marine and Coastal Access Act 2009'. Available at: https://www.legislation.gov.uk/ukpga/2009/23/contents

Ref 7.21: HMSO. (2021). 'The Environment Act'. HMSO, London.

Ref 7.22: Ministry of Housing, Communities and Local Government and Department for Levelling Up, Housing and Communities. (2021). 'Planning Practice Guidance'. Available at: https://www.gov.uk/government/collections/planning-practice-guidance

Ref 7.23: Natural England. (2023). 'MAGIC website'. Available at: http://www.natureonthemap.naturalengland.org.uk/home.html

Ref 7.24: Ordnance Survey. (2023). Available at: https://www.ordancesurvey.co.uk

Ref 7.25: The Rivers Trust. (2021). 'River Obstacles Application'. Available at: https://river-obstacles-theriverstrust.hub.arcgis.com

Ref 7.26: Environment Agency. (2023). 'Catchment Data Explorer'. Available at: https://environment.data.gov.uk/catchment-planning.

Ref 7.27: Environment Agency. (2023). 'Ecology and Fish Data Explorer'. Available at: https://defra-ecology-prod.publishmydata.com/ecology-fish/

Ref 7.28: Estuary Edges. (2023). 'Estuary Edges- Case Studies'. Available at: https://www.estuaryedges.co.uk/case-studies/barking-creek-creekmouth /

Ref 7.29: ZSL. (2021). 'The State of the Thames 2021: Environmental trends of the Tidal Thames. McCormick, H., Cox, T., Pecorelli, J., and Debney, A.J. (Eds)'. ZSL, Regent's Park, London, UK. Available at: https://www.zsl.org/what-we-do/projects/state-of-the-thames-2021.

Ref 7.30: ZSL Bournemouth University & SC2. (2020). 'Thames Tideway Aquatic Ecology Research – Smelt Surveys on the Thames'. Available at: https://www.tideway.london/news/press-releases/2021/november/thames-ecology-research-programme/

Ref 7.31: ZSL (2022). 'The Thames European Eel Project Report'. Available at: https://www.zsl.org/what-we-do/projects/european-eel-conservation

Ref 7.32: ZSL. (2016). 'Guidance Document. Conservation of Tidal Thames Fish through the Planning Process'. Available at: https://www.zsl.org/what-we-do/projects/fish-conservation-in-tidal-thames

Ref 7.33: ZSL. (2023). 'The Greater Thames Shark Project'. Available at: https://www.zsl.org/what-we-do/projects/greater-thames-shark-project

Ref 7.34: ZSL. (2016). 'Guidance Document. Conservation of Tidal Thames Fish through the Planning Process'. Available at: https://www.zsl.org/what-we-do/projects/fish-conservation-in-tidal-thames

Ref 7.35: ZSL. (2023). 'Thames Marine Mammal Survey'. Available at: https://sites.zsl.org/inthethames/?&_ga=2.236522569.972409256.1675155190-1564284012.1675155189#Public%20sightings

Ref 7.36: ZSL. (2023). 'Invasive Species in the Thames'. Available at: https://www.zsl.org/conservation/regions/uk-europe/thamesestuary/invasive-species-in-the-thames,933,AR.html

Ref 7.37: ZSL. Bournemouth University & SC2 (2019). 'Larval and juvenile fish in the Thames: Investigating early life history stages (ELHS) to understand ecological function of the tidal Thames and the impact of improved water quality'. Available at: https://www.tideway.london/news/press-releases/2021/november/thames-ecology-research-programme/

Ref 7.38: Environment Agency. (2021). 'Water Quality Archive- Thames At Erith'. Available at: https://environment.data.gov.uk/water-quality/view/sampling-point/TH-PTTR0019

Ref 7.39: Greater London Borough of Bexley. (2016). 'Sites Of Importance For Nature Conservation Report'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-10/Sites-of-Importance-for-Nature-Conservation-SINC-Report-2016C.pdf

Ref 7.40: ABPmer. (2013). Hub for London, Ecology Desk Study Part B: Marine and Coastal Baseline. Report No: Report R.2130

Ref 7.41: Transport for London. (2016). 'Silvertown Tunnel, 6.1 Environmental Statement'. Available at: https://infrastructure.planninginspectorate.gov.uk/projects/london/silvertown-tunnel/.

Ref 7.42: Thames Water Utilities Limited. (2014). 'Thames Tideway Tunnel, ES Volume 24: Greenwich Pumping Station'. Available at: London Tideway ES; Volume 24: Greenwich Pumping Station https://www.tideway.london/media/1748/6224-environmental-statement-volume-24-greenwich-pumping-station-site-assessment-sections-1-to-15.pdf

Ref 7.43: Transport for London. (2015). 'Silvertown Tunnel Preliminary Environmental Information Report'. Available at: https://infrastructure.planninginspectorate.gov.uk/projects/london/silvertown-tunnel/

Ref 7.44: Ballerstedt. (2006). '*Electra crustulenta*. A sea mat. Marine Life Information Network: Biology and Sensitivity Key Information Subprogramme. Plymouth: Marine Biological Association of the United Kingdom'. Available at: http://www.marlin.ac.uk/speciesinformation.php?speciesID=3245

Ref 7.45: Attrill, M.J., (2002). 'A testable linear model for diversity trends in estuaries'. J Animal Ecol 71(2): 262-269.

Ref 7.46: Balanced Seas. (2011). 'Balanced Seas Marine Conservation Zone Project. Final Recommendations'. Available at: http://publications.naturalengland.org.uk/publication/1463173.

Ref 7.47: Birtwell, I.K. and Arthur, D.R., (1980). 'The ecology of tubificids in the Thames estuary with particular reference to Tubifex costatus (Claparede)'. IAquatic oligochaete biology pp. 331-381.

Ref 7.48: Aston, R.J., (1973). 'Tubificids and water quality: a review'. Environmental Pollution (1970), 5(1), pp.1-10.

Ref 7.49: The Rivers Trust. (2023). 'Sewage Map Application'. Available at: https://theriverstrust.org/key-issues/sewage-in-rivers.

Ref 7.50: Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. (2012). 'Spawning and nursery grounds of selected fish species in UK waters'. Sci. Ser. Tech. Rep., Cefas Lowestoft. Available at: https://www.cefas.co.uk/publications/techrep/techrep147.pdf

Ref 7.51: Holliday, F.G.T., & Blaxter, J.H.S. (1960). 'The effects of salinity on the developing eggs and larvae of the herring'. J. Mar. Biol. Assoc. UK, 39(3), 591-604

Ref 7.52: Cox, T., Barker, J., Bramley, J., Debney, A., Thompson, D. and Cucknell A.C (2020). 'Population trends of harbour and grey seals in the Greater Thames Estuary'. Mammal Communications 6:42-51

Ref 7.53: Cucknell, A., Moscrop. A, Boisseau, O. & McLanaghan, R. (2020). 'Confirmation of the presence of harbour porpoise (*Phocoena phocoena*) within the tidal Thames and Thames Estuary'. Mammal Communications 6: 21-28, London.

Ref 7.54: Port of London Authority. (2023). 'Marine mammals in the tidal Thames'. Available at: http://www.pla.co.uk/Environment/Marine-Mammals-in-the-Tidal-Thames.

Ref 7.55: The International Union for Conservation of Nature. (2023). 'Red List of Threatened Species'. Available at: https://www.iucnredlist.org/

Ref 7.56: CIEEM. (2016). 'Guidelines on Ecological Impact Assessment in the UK and Ireland: Terrestrial'. Freshwater and Coastal, 2nd edition. Available at: https://cieem.net/wp-content/uploads/2019/02/Combined-EclA-guidelines-2018-compressed.pdf

Ref 7.57: The Marine Life Information Network (MarLIN). (2023). Available at: https://www.marline.ac.uk

Ref 7.58: CIEEM. (2019). Advice Note on the Lifespan of Ecological Reports and Surveys. Available at: https://cieem.net/wp-content/uploads/2019/04/Advice-Note.pdf

8. HERITAGE

8.1. INTRODUCTION

8.1.1. This chapter considers the impacts of the Proposed Scheme on the historic environment during construction and operation, and any potential significant effects. It sets out the proposed methodology for the historic environment assessment and identifies those impacts that can be scoped out of the assessment. Where necessary further assessment required will be presented in the ES.

8.1.2. Statutory provision for the safeguarding of heritage assets has been made at a national and local level. Heritage assets can comprise below and above ground archaeological remains, buildings, structures, monuments or heritage landscapes.

8.2. LEGISLATION, POLICY AND GUIDANCE

8.2.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is detailed in **Table 8-1**.

Table 8-1: Historic Environment –Summary of Key Legislation, Policy and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011 (Ref 8.1)	Sets out the Government's policy for delivery of major energy infrastructure and will be the primary basis for decision making. NPS EN-1 sets out policy in relation to harm to the significance of heritage assets. Its requirements for the historic environment are broadly similar to those in NPPF. Paragraph 5.8.9 states that representative visualisations may be necessary to explain potential impacts on the setting of a heritage asset as a result of a proposed development.
Draft Overarching National Policy Statement for Energy 2021 (Ref 8.2)	The Government has published a draft update to the Overarching National Policy Statement for Energy. Paragraph 5.9.14 states that '*applicants are encouraged, where opportunities exist, to prepare proposals which can make a positive contribution to the historic environment*'.

Policy / Legislation / Guidance	Description
National Planning Policy Framework (NPPF) 2021 (Ref 8.3)	Presents the Government's planning policies for England and how these are expected to be applied. Provides guidance for planning authorities and developers on the conservation and investigation of heritage assets.
The London Plan 2021 (Ref 8.4)	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 HC1 is the key policy specific to heritage conservation and growth, 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:* *1) setting out a clear vision that recognises and embeds the role of heritage in place-making* *2) utilising the heritage significance of a site or area in the planning and design process* *3) 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*

Policy / Legislation / Guidance	Description
	4) 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. *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 re-use.*"
London Borough of Bexley Core Strategy 2012 (Ref 8.5)	The Core Strategy sets out the Council's long-term vision for development in the borough. The following policy is relevant to heritage: "*Policy CS19 – 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*

Policy / Legislation / Guidance	Description
	effects of climate change. This will enhance the local sense of place and underpin the revitalisation and development of the borough, including promoting the visitor economy. This will be achieved by: *a) promoting the borough's heritage assets, such as Danson Mansion, Hall Place and Gardens, Crossness Beam Engine House and Red House;* *b) reviewing the status of existing and identifying new heritage and archaeological assets;* *c) conserving and enhancing the significance of heritage assets, their setting, and the wider historic environment, including statutorily listed buildings; locally listed buildings of architectural or historic interest, conservation areas, registered parks and gardens, and archaeological sites;* *d) protecting heritage assets from development that is likely to adversely impact on the significance, integrity, character or appearance of an asset or its setting;* *e) supporting historic restoration schemes through partnership working and seeking funding to enhance heritage and archaeological assets in an appropriate and sympathetic manner; and* *f) 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.*"

Policy / Legislation / Guidance	Description
London Borough of Bexley Council Unitary Development Plan (UDP) 2004 (Ref 8.6)	The main purpose of the Unitary Development Plan is to provide a framework for guiding development, and to show how land will be used as a resource for achieving the Council's wider objectives. The following saved policy is relevant to heritage: "*Policy ENV51 – The Council will oppose the demolition of any listed building, in whole or in ENV51 part, or of any structure within the curtilage of a listed building which contributes to the character of that building and will resist any proposals which detract from the setting of a listed building and in considering any proposal to alter or extend a listed building, will have regard to the desirability of preserving the building and its setting.*"
London Borough of Bexley Draft Local Plan 2021 (Ref 8.7)	The new Local Plan is awaiting adoption and will then replace the Bexley Core Strategy and Saved UDP policies 2012. The following draft policies are relevant to heritage: • SP6 – Managing Bexley's heritage assets; and • SDP14 – Development affecting a heritage asset.
Locally Listed Buildings and Structures in the London Borough of Bexley, of Architectural or Historic Interest 2019 (Ref 8.8)	List of all locally listed buildings and structures in the Borough which includes information on their location and year of entry.
Legislation	
Burial Act 1857 (Ref 8.9)	Development affecting any former burial ground is regulated by statute, including this Act.

Policy / Legislation / Guidance	Description
Infrastructure Planning (Decision) Regulations 2010 (Ref 8.10)	Sets out the legal requirements for the control of development that affects listed buildings and their settings, scheduled monuments and their settings and conservation areas.
Guidance	
National Planning Practice Guidance (2021) (Ref 8.11)	Explains the processes and tools that can be used through the planning system in England. This guidance advises on enhancing and conserving the historic environment.
Chartered Institute for Archaeologists (CIfA) Code of Conduct 2014 (Ref 8.12)	Sets out the standards of conduct and self-discipline required of members of CIfA.
CIfA Standard and Guidance for Commissioning Work or Providing Consultancy Advice on Archaeology and the Historic Environment 2014 (Ref 8.13)	Defines good practice in the provision of archaeological advice and / or the procurement of services.
CIfA Standard and Guidance for Historic Environment Desk-Based Assessment 2014 (Ref 8.14)	Defines good practice for the execution and reporting of historic environment desk-based assessments.
The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning Note 3. 2nd Edition 2017 (Ref 8.15)	Provides advice on the setting of heritage assets (i.e. the surroundings in which a heritage asset is experienced).
Statements of Heritage Significance: Analysing Significance in Heritage Assets – Advice Note 12 2019 (Ref 8.16)	Sets out a staged approach to describing and analysing heritage significance to help curators to make decisions on the impact of proposals for change to heritage assets.
Guidelines for Landscape and Visual Impact Assessment. 3rd Edition 2013 (Ref 8.17)	Sets out guidelines for undertaking landscape and visual impact assessment.

Policy / Legislation / Guidance	Description
Conserving and Enhancing the Historic Environment: Planning Practice Guidance 2019 (Ref 8.18)	Advises on enhancing and conserving the historic environment.

8.3. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

8.3.1. The baseline conditions will be established as part of the PEIR and subsequent ES. The section below provides a high-level overview of the types of assets that may be present within the Site Boundary and its surroundings that will require further assessment.

8.3.2. The information gathered and presented within the ES for Riverside 2 will inform the baseline relevant to heritage, where relevant.

Above-Ground Heritage Assets

8.3.3. The Site contains no designated (protected) above-ground heritage assets. Crossness Conservation Area is located 760m to the west of the Site Boundary and includes three listed buildings, all of which were constructed in the 1860s. These are the Grade I listed Crossness Pumping Station (NHLE ref: 1064241), the Grade II listed Workshop Range to the southeast of the Main Engine House at Crossness Pumping Station (NHLE ref: 1064216) and the Grade II listed Workshop Range to the southwest of the Main Engine House at Crossness Pumping Station (NHLE ref: 1250557).

8.3.4. The Grade II listed No. 4 Jetty and Approach at Dagenham Dock (NHLE ref: 1391706) dates to the late 19th or early 20th century and is located 750m north-west of the Site Boundary.

Buried and Submerged Heritage Assets

8.3.5. The Site lies within the Thamesmead and Erith Marshes Archaeological Priority Area, which would have been regularly flooded during the prehistoric period and ideal for the exploitation of natural resources including waterfowl, fish, wood and reeds. Prehistoric finds identified within the marshland area mostly comprise flint tools, but typically there is potential for forest or built wooden structures to be preserved. Over 3,000 flint artefacts were recorded to the south of Erith town centre, likely representing a Mesolithic tool production centre. A preserved Late Mesolithic forest was identified approximately 600m to the west of the Site, within the Crossness Sewage Treatment Works. Evidence of Roman occupation has been encountered within the marshland, mostly upon areas of higher ground (**Ref 8.23)**. Subsequent historic ground-raising may have preserved remains relating to prehistoric or Roman wetland resource exploitation (e.g. timber revetments, trackways, boats, jetties and

fish traps). Alluvial sediment (silts, clays and peat) can also have high potential for ecofact preservation (e.g. pollen, seeds, plant fragments, molluscs, diatoms, ostracods and insects) that can provide information on environment and landscape that enhance interpretation of archaeology (**Ref 8.24**). The channel and inter-tidal areas may potentially have wrecks, hulked marine vessels, sunken jetties and other marine obstructions of heritage interest.

FUTURE BASELINE

8.3.6. The future baseline for the Proposed Scheme will include the operation of Riverside 2.

8.3.7. 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.

8.3.8. In terms of the intertidal foreshore area of the Site, ongoing fluvial 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 as part of the EIA process through consultation with the design team who will advise on the erosion and deposition pre- and post-development (i.e. operation phase).

8.4. STUDY AREA

8.4.1. In order to determine the full historic environment potential within the Site Boundary, a broad range of standard documentary and cartographic sources, including results from any archaeological investigations within 1km of the Site Boundary, will be examined to determine the likely nature, extent, preservation and significance 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 will be made to key heritage assets beyond the Study Area.

8.4.2. The Study Areas for the above-ground heritage assets settings assessment comprise:

- 1km from the Site Boundary for designated above-ground heritage assets. This Study Area has been informed by a digital Zone of Theoretical Visibility (ZTV) which indicates likely visibility of the Proposed Scheme within the surrounding area. Professional judgement will be 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 9: Townscape and Visual Impact**. Potentially affected designated heritage assets identified at this stage are discussed in **paragraphs 8.3.2** and **8.3.3**.
- 500m from the Site Boundary for non-designated above-ground heritage assets, including locally listed buildings. The nearest non-designated above-ground

heritage asset is an early 20th century concrete police box approximately 480m 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. No other non-designated above-ground heritage assets will be assessed.

8.5. SENSITIVE RECEPTORS / HERITAGE ASSETS

8.5.1. There are no designated heritage assets located within the Site Boundary.

8.5.2. The following sensitive receptors have been identified at this stage:

- known and potential non-designated buried and submerged heritage assets within the Site (archaeological and palaeoenvironmental remains) including potential archaeological remains within the Thames foreshore (marine);
- designated above-ground heritage assets within the 1km Study Area and their setting (**paragraphs 8.3.2** and **8.3.3**); and
- non-designated above-ground heritage assets within a 500mStudy Area and their setting.

8.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

8.6.1. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- design adjustments to minimise/negate impacts on the heritage significance of above-ground heritage assets through changes to their setting, including raising or lowering road formation levels, environmental screening, planting, and sound bunds;
- design adjustments to allow significant buried and submerged heritage assets to be protected and retained (preservation *in situ*); and
- investigation and recording before and during development, with dissemination at an appropriate level (preservation by record). This might involve site-based investigation, such as:
  - a trial trench/pit evaluation to clarify the archaeological potential of the Site;
  - marine surveys for archaeological purposes; and
  - subsequent mitigation in the form of targeted archaeological excavation and recording, and/or an archaeological watching brief for remains of lesser heritage significance.

8.6.2. Heritage assets are an irreplaceable resource. Consequently, implementing mitigation measures to offset any level of adverse effect on a heritage asset, (including effects that are minor adverse) is recognised as standard practice within the planning system. This is to ensure that finite and irreplaceable remains are not removed/lost without record. The level of mitigation proposed will be, in each case, proportionate to the significance of the heritage asset being affected.

8.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

8.7.1. During construction, anything that would cause ground disturbance, such as preliminary ground works, site strip/topsoil removal, remediation, landscaping, planting, piling, dredging, excavation for foundations, services, drainage and lighting could potentially have an impact on known or possible buried and submerged heritage assets and palaeoenvironmental deposits. Such impacts are likely to be permanent and irreversible and have the potential to result in significant effects.

8.7.2. There is also a potential for impacts on heritage assets (designated and non-designated) through temporary changes in setting resulting from construction activity, including temporary visual intrusion, an increase in noise, lighting and vibration from construction related vehicles, or an increase in dust and pollution. Impacts would result in changes in the townscape around the asset, which could reduce the contribution of the setting to the heritage significance of the asset. This could result in a significant effect on an asset, where the setting contributes to the heritage significance.

OPERATION PHASE

8.7.3. There is a potential for impacts to the setting of statutorily designated heritage assets during the operation phase. Impacts to setting could occur from the visual intrusion of the Proposed Scheme, for example, or from a perceptible change in noise and lighting, which would change the way the asset is experienced. The impacts could be adverse or beneficial, depending on the heritage asset, its location and the contribution of setting to its significance. There is a potential, therefore, for the operation of the Proposed Scheme to result in a significant effect (both adverse and beneficial).

8.7.4. The likely potential significant effects associated with the operation phase include:

- permanent changes to the setting of designated above-ground heritage asset. This potential impact is based on the nature of the Proposed Scheme and the location and setting of any heritage asset in relation to the Proposed Scheme; and
- potential operation stage effects on submerged or deeply buried heritage assets, due to dredging and changes in environmental conditions as a result of the Proposed Scheme (i.e. subsequent scouring from the tide and currents which could disturb submerged archaeological remains).

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

8.7.5. The impacts scoped in or out for the historic environment are as follows:

Table 8-2: Historic Environment: Impacts Scoped In or Out of Further Assessment

Impacts	Phase	Scoped In	Scoped Out	Justification
Potential physical effects on unknown buried heritage assets within the Site Boundary (archaeological remains), including potential submerged remains within the Thames foreshore (marine).	Construction	✓		Potential for direct physical impacts due to construction activities (excavation, dredging, piling etc.) associated with the construction of the Proposed Scheme. The location for the disposal of dredged arisings, or their potential for re-use will be confirmed as the design of the Proposed Scheme progresses, any impacts to terrestrial archaeology due to t reuse on site of dredged arisings will be considered accordingly within the PEIR and the ES.
Potential indirect effects on unknown buried heritage assets within the Site Boundary (archaeological remains), including potential submerged remains within the Thames foreshore (marine).	Operation	✓		Potential for environmental/fluvial changes (or scour) leading to the erosion or 'drying' out of buried assets due to changes in conditions following the completion of the construction phase.

Impacts	Phase	Scoped In	Scoped Out	Justification
Potential temporary, construction phase effects on designated above-ground heritage assets located beyond the Site Boundary and within the Study Area.	Construction		✓	Construction impacts are scoped out as these are short-term (60 months) and temporary and not considered significant.
Potential permanent effects on designated above-ground heritage assets located beyond the Site Boundary and within the Study Area through changes to setting.	Operation	✓		There is the potential for permanent changes to the setting of 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.	Construction		✓	In accordance with the NPPF guidance on proportionality, 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. The assessment will therefore focus on the most sensitive receptors, designated by Historic England as being of significance.

Impacts	Phase	Scoped In	Scoped Out	Justification
Setting of non-designated above-ground heritage assets not afforded protection in the Local Plan located beyond the Site Boundary.	Operation		✓	In accordance with the NPPF guidance on proportionality, 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. The assessment will therefore focus on the most sensitive receptors, designated by Historic England as being of significance.

8.8. PROPOSED ASSESSMENT METHODOLOGY

8.8.1. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with the Greater London Archaeology Advisory Service (GLAAS), as advisor to the LBB and the EA. Based on the likely environment effects set out above, the scope of the assessment will include the following:

ESTABLISHING THE BASELINE

8.8.2. The PEIR and ES Chapter will be supported by a technical appendix in the form of a fully illustrated historic environment desk-based assessment (HEDBA). This will include a detailed baseline compiled through a broad range of standard data sources. The key sources of information on baseline historic environment conditions will be:

- National Heritage List for England (NHLE) for information on statutory designated heritage assets, including scheduled monuments, listed buildings and protected wrecks. The Heritage at Risk register would also be consulted;
- Historic England for guidance on decision-taking in the historic environment and for information on Archaeological Priority Areas (APAs);
- Greater London Historic Environment Record (HER) 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;
- Wrecks and obstructions search for the foreshore to identify possible heritage assets, such as hulked marine vessels, within the proposed land reclamation areas;
- LBB for information on APAs, 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; and
- 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).

8.8.3. The assessment will also include a site walkover inspection 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 would extend to selected designated heritage assets located beyond the Site Boundary, based on the ZTV and professional judgement, to consider potential impacts to them and their setting (e.g. visible changes to historic character and views).

ASSESSING IMPACTS AND EFFECTS

8.8.4. Following the characterisation of baseline conditions, the methodology used to characterise the likely environmental effects on above-ground heritage assets and potential buried and submerged heritage assets will entail:

- evaluating the heritage significance 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 of above-ground heritage assets selected for assessment;
- predicting the magnitude of change upon the known or potential heritage significance 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 negative effects; and
- quantifying any residual effects (those that might remain after mitigation).

8.8.5. The assessment would be undertaken in accordance with the requirements of the National Policy Statement for Energy (NPS EN-1) and NPPF (**Ref 8.1** and **8.3**) as well as standards specified by the Chartered Institute for Archaeologists (**Ref 8.13** and **Ref 8.14**) and Historic England (**Ref 8.15 - 8.16** and **8.20 - 8.22**).

HERITAGE SIGNIFICANCE CRITERIA

8.8.6. The NPPF defines heritage significance as *"The value of a heritage asset to this and future generations because of its heritage interest. That interest may be historic, archaeological, architectural or artistic"* (**Ref 8.3**). The determination of the significance is based on statutory designation and/or professional judgement.

8.8.7. Each asset is evaluated against the range of criteria listed above 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 significance is often uncertain.

8.8.8. In relation to significant heritage assets, the assessment considers the contribution that the historic character and setting makes to the overall heritage significance of the asset.

8.8.9. The table below gives examples of the significance of designated and non-designated heritage assets.

Table 8-3: Significance (value) of Heritage Assets

Heritage Asset Description	Significance (value)
World Heritage Sites	Very 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 significance)** **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)**	High
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** **Non-designated Heritage Assets ((above ground structures, landscape, townscape, buried and submerged remains, including hulked marine vessels) of regional importance)**	Medium

Heritage Asset Description	Significance (value)
Non-designated Heritage Assets ((above ground structures, landscape, townscape, buried and submerged remains, including hulked marine vessels) of local importance)	Low
Item with no significant heritage value or interest.	Negligible
Heritage assets that have a clear potential, but for which current knowledge is insufficient to allow significance to be determined.	Uncertain

MAGNITUDE OF CHANGE

8.8.10. The determination of magnitude of change upon the heritage significance of known or potential heritage assets will be 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 changes to the contribution of setting to the heritage significance of a given built heritage asset.

8.8.11. The table below presents the criteria to be used in this assessment to determine the magnitude of change.

Table 8-4: Magnitude of Change

Magnitude of Change	Description of Change
High	Complete removal of asset. Change to asset significance 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 significance 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 significance; or the unrecorded loss of archaeological interest.

Magnitude of Change	Description of Change
Low	Change to asset significance 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 significance. 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.

SIGNIFICANCE OF ENVIRONMENTAL EFFECT

8.8.12. The assessment of potential likely significant effects will consider both the construction (including site preparation and demolition) and operation phases. The attribution of the significance level of each effect will be assessed based on the heritage significance of the affected receptor (heritage asset) and the magnitude of change (impact) to the heritage significance of the receptor due to the Proposed Scheme (outlined in **Table 8.5** below). The significance terminology used in **Table 8.5** is consistent with the matrix for Determining Significance of Effect shown in **Chapter 3: EIA Methodology**.

8.8.13. Effects may be either negative (adverse) or positive (beneficial) and are defined initially without additional mitigation, with residual effects then identified with the application of any appropriate additional mitigation. This table is a guide only, so that the process is transparent and 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 will be applied to select the most appropriate significance of effect.

8.8.14. Where information is insufficient to be able to quantify either the asset significance 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 significance of which is uncertain due to the absence of any site-based investigation.

Table 8-5: Significance of Historic Environment Effect

		Heritage Asset (Receptor) Heritage Significance			
		Very High	**High**	**Medium**	**Low**
Magnitude of Change (Impact)	**High**	Major	Major	Major or Moderate	Moderate or Minor
	Medium	Major or Moderate	Major or Moderate	Major or Moderate	Minor
	Low	Moderate or Minor	Moderate or Minor	Minor	Minor
	Negligible	Minor or Negligible	Minor or Negligible	Negligible	Negligible

8.8.15. 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 positive or negative) on heritage assets (receptors).
- **Moderate Effect:** where the Proposed Scheme could be expected to have a noticeable effect (either positive or negative) on heritage assets (receptors).
- **Minor Effect:** where the Proposed Scheme could be expected to result in a small, barely noticeable effect (either positive or negative) on heritage assets (receptors).
- **Negligible:** where no discernible effect is expected as a result of the Proposed Scheme on heritage assets (receptors).

8.8.16. Residual effects classified as moderate or above are considered to be 'significant'. Residual effects classified as minor or below are considered to be 'not significant'.

8.9. ASSESSMENT LIMITATIONS AND ASSUMPTIONS

8.9.1. The following limitations and assumptions have been identified:

- This chapter provides a high-level appraisal of the key heritage concerns. It has not included a review of a full range of resources (e.g. documentary, cartographic, air photographic, and geotechnical, architectural and engineering sources). A full desk-based assessment will be presented in the ES.

8.9.2. Notwithstanding this, the methodology proposed here is considered robust, utilising reasonably available information, and conforms to the requirements of local and national guidance and planning policy.

8.10. REFERENCES

Ref 8.1: Department of Energy & Climate Change. (2011). 'Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 8.2: Department of Energy and Climate Change. (2021). 'Draft Overarching National Policy Statement for Energy (EN-1)'. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf

Ref 8.3: Ministry of Housing, Communities & Local Government. (2021). 'National Planning Policy Framework'. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

Ref 8.4: Greater London Authority. (2021). 'The London Plan – The Spatial Development Strategy for Greater London'. Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

Ref 8.5: London Borough of Bexley Council. (2012). 'Local Development Framework – Development Plan Document: Bexley Core Strategy'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Core-Strategy.pdf

Ref 8.6: London Borough of Bexley Council. (2004). 'Unitary Development Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-12/Bexley-unitary-development-plan-written-statement-2004.pdf

Ref 8.7: London Borough of Bexley Council. (2021). 'Draft Local Plan: Proposed Submission Document – Regulation 19 Stage'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-10/Draft-local-plan-proposed-submission-document-reg-19-may-2021.pdf

Ref 8.8: London Borough of Bexley Council. (2019). 'Locally listed buildings and structures in the London Borough of Bexley, of architectural or historic interest'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Local-List-November-2019.pdf

Ref 8.9: Burial Act 1857. (c.81). 'London: HMSO'. Available at: https://www.legislation.gov.uk/ukpga/Vict/20-21/81/section/23

Ref 8.10: Ministry of Housing, Communities & Local Government. (2010). 'The Infrastructure Planning (Decisions) Regulations 2010'. Available at: https://www.legislation.gov.uk/ukdsi/2010/9780111490266/contents

Ref 8.11: Ministry of Housing, Communities and Local Government and Department for Levelling Up, Housing and Communities. (2021). 'Planning Practice Guidance'. Available at: https://www.gov.uk/government/collections/planning-practice-guidance

Ref 8.12: Chartered Institute for Archaeologists [CIfA]. (2014). 'Code of Conduct'. Available at: https://www.archaeologists.net/sites/default/files/CodesofConduct.pdf

Ref 8.13: CIfA. (2014). 'Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment'. Available at: https://www.archaeologists.net/sites/default/files/CIfAS&GCommissioning_1.pdf

Ref 8.14: CIfA. (2014). 'Standard and guidance for historic environment desk-based assessment'. Available at: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf

Ref 8.15: Historic England. (2017). 'The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning Note 3. 2nd edition'. Available at: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets/

Ref 8.16: Historic England. (2019). 'Statements of Heritage Significance: Analysing Significance in Heritage Assets – Advice Note 12'. Available at: https://historicengland.org.uk/images-books/publications/statements-heritage-significance-advice-note-12/

Ref 8.17: Landscape Institute and Institute of Environmental Management and Assessment. (2013). 'Guidelines for Landscape and Visual Impact Assessment. 3rd edition'. Available at: https://www.torbay.gov.uk/media/15326/68-guidelinesforlandscapeandvisualimpactassessment-_3rd-edition_2013.pdf

Ref 8.18: Ministry of Housing, Communities & Local Government. (2019). 'Conserving and Enhancing the Historic Environment: Planning Practice Guidance'. Available at: https://www.gov.uk/guidance/national-planning-policy-framework/16-conserving-and-enhancing-the-historic-environment

Ref 8.19: London Borough of Bexley Council. (2009). 'Crossness Conservation Area – Area Appraisal and Management Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Crossness-Conservation-Area-Appraisal-and-Management-Plan.pdf

Ref 8.20: Historic England. (2008). 'Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment'. Available at: https://historicengland.org.uk/images-books/publications/conservation-principles-sustainable-management-historic-environment/

Ref 8.21: Historic England. (2015). 'Managing Significance and Decision-Taking in the Historic Environment – Historic Environment Good Practice Advice in Planning Note *2'*. Available at: https://historicengland.org.uk/images-books/publications/gpa2-managing-significance-in-decision-taking/

Ref 8.22: Historic England. (2016). 'Greater London Archaeological Priority Area Guidelines'. Available at: https://historicengland.org.uk/images-books/publications/greater-london-archaeological-priority-area-guidelines/heag098-glaas-archaeological-priority-areas/

Ref 8.23: Historic England. (2020). ‘London Borough of Bexley – Archaeological Priority Areas Appraisal’. Available at: https://www.bexley.gov.uk/sites/default/files/2021-05/London-borough-of-bexley-archaeological-priority-areas-appraisal-january-2020.pdf

Ref 8.24: WSP. (2022). ‘Riverside Heat Network, Norman Road – Technical Note: Cultural Heritage and Archaeology [Ref: 70087576]’. Available at: https://pa.bexley.gov.uk/online-applications/applicationDetails.do?activeTab=documents&keyVal=R95PWABEI2B00

9. TOWNSCAPE AND VISUAL IMPACT

9.1. INTRODUCTION

9.1.1. This chapter considers the impacts of the Proposed Scheme on townscape character and visual impact during construction and operation at years one and 15, and any potential significant effects. It sets out the proposed methodology for the Townscape and Visual Impact Assessment (TVIA) and identifies those impacts that can be scoped out of the assessment. Where necessary, further assessment will be presented in the ES.

9.1.2. An Arboricultural Impact Assessment (AIA) will consider the impacts of the Proposed Scheme on arboricultural features. The AIA will form an Appendix to the TVIA chapter in the ES.

9.2. POLICY, LEGISLATION, AND GUIDANCE

9.2.1. The policy, legislation, and guidance relevant to the TVIA of the Proposed Scheme is detailed in **Table 9-1**.

Table 9-1: Townscape and Visual Impact – Summary of Key Policy, Legislation, and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011 (Ref 9.1)	Sets out the Government's policy for delivery of major energy infrastructure and will be the primary basis for decision making. 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 2021 (Ref 9.2)	The Government has published a draft update to the Overarching National Policy Statement for Energy. For townscape the 2021 Draft NPS EN-1 is largely the same as in the 2011 document.
National Planning Policy Framework (NPPF) 2021 (Ref 9.3)	Presents the Government's planning policies for England and how these are expected to be applied. 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.

Policy / Legislation / Guidance	Description
The London Plan 2021 (Ref 9.4)	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. 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 D4: Delivering good design; • Policy D9: Tall buildings; • Policy HC3: Strategic and Local Views; and • Policy HC4: London View Management Framework.
London Borough of Bexley Core Strategy 2012 (Ref 9.5)	The Core Strategy sets out the Council's long-term vision for development in the Borough. It aims to support a strong, sustainable and cohesive community. Policy CS01: Achieving Sustainable Development, relates to the protection and enhancement of townscape character and visual amenity.
London Borough of Bexley Unitary Development Plan (UDP) 2004 (Ref 9.6)	The main purpose of the UDP is to provide a framework for guiding development, and to show how land will be used as a resource for achieving the Council's wider objectives. Policy ENV39: Built Environment relates to the protection and enhancement of townscape character and visual amenity.
London Borough of Bexley Draft Local Plan 2021 (Ref 9.7)	The new Local Plan is awaiting adoption and will then replace the Bexley Core Strategy and Saved UDP policies 2012. The following policies relate to the protection and enhancement of townscape character and visual amenity: • SP5: Placemaking through good design; • DP11: Achieving high-quality design;

Policy / Legislation / Guidance	Description
	• DP12: Tall buildings and building heights; and • DP13: Protecting local views.
Bexley Local Character Study 2021 (Ref 9.8)	Definition of spatial qualities within Bexley and identification of Natural Landscape Areas.
Crossness Conservation Area Appraisal and Management Plan 2009 (Ref 9.9)	Identification of extent, qualities and management of Crossness Heritage Conservation Area.
Erith Road Conservation Area Appraisal and Management Plan 2008 (Ref 9.10)	Identification of extent, qualities and management of Erith Road Heritage Conservation Area.
Woolwich Road Conservation Area Appraisal and Management Plan 2008 (Ref 9.11)	Identification of extent, heritage qualities and management of Woolwich Road Heritage Conservation Area.
Locally Significant Views within London Borough of Bexley 2021 (Ref 9.12)	Identification of locally designated views within the London Borough of Bexley.
London View Management Framework 2012 (Ref 9.13)	Identification of views designated by the London Plan to be considered in the determination of planning applications.
Legislation	
European Landscape Convention (ELC) 2000 (Ref 9.14)	European Union treaty signed by the UK to include planning, protection and management of landscape within policy.
Guidance	
National Planning Practice Guidance (2021) (Ref 9.15)	Sets out the Government's planning policies for England and provides guidance for planning authorities and developers on the assessment of environmental impact.
Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3) 2013 (Ref 9.16)	Sets out guidelines for undertaking a landscape/townscape/seascape and visual impact assessment.

Policy / Legislation / Guidance	Description
LA107: Landscape and Visual Effects, Revision 2 2020 (Ref 9.17)	Sets out guidelines for undertaking a landscape/townscape and visual impact assessment.
LA104: Environmental Assessment and Monitoring, Revision 1 2020 (Ref 9.18)	Sets out the requirements for environmental assessment of projects, including reporting and monitoring of significant adverse environmental effects including townscape character and visual amenity.
Townscape Character Assessment Technical Information Note 05/2017 2018 (Ref 9.19)	Provides advice on how to identify and assess townscape character.
Visual Representation of Development Proposals Technical Guidance Note 06/2019 2019 (Ref 9.20)	Provides advice on how to capture and represent visual amenity through representative viewpoints and how the viewpoints should be presented.

9.2.2. The policy, legislation, and guidance relevant to the AIA of the Proposed Scheme is detailed in **Table 9-2**. NPSEN-1 (2011) and the Draft Overarching NPS for Energy EN-1 (2021) have been excluded from **Table 9-2** due to a lack specific policies regarding arboriculture.

Table 9-2: Arboriculture – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
National Planning Policy Framework (NPPF) 2021 (Ref 9.3)	Presents the Government's planning policies for England and how these are to be applied. The NPPF states that *"planning policies and decisions should ensure that new streets are tree-lined, that opportunities are taken to incorporate trees elsewhere in developments (such as parks and community orchards)".* It also advises that existing trees should be maintained wherever possible and that planners should ensure measures are in place for the long-term maintenance of newly planted trees.

Policy / Legislation / Guidance	Description
The London Plan 2021 (Ref 9.4)	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 G7: Trees and Woodlands within Chapter 8 states borough Development Plans, should: 1. *"Protect 'veteran' trees and ancient woodland where these are not already part of a protected site"*; and 2. *"Identify opportunities for tree planting in strategic locations"*.
London Borough of Bexley Unitary Development Plan (UDP) 2004 (Ref 9.6)	The main purpose of the UDP is to provide a framework for guiding development, and to show how land will be used as a resource for achieving the Council's wider objectives. Policy ENV35: The Council will seek the protection and long term retention of trees of amenity, nature or landscape conservation value on development sites or elsewhere where they might be at risk and, in appropriate cases, will require new tree and hedge planting as part of a landscaping scheme for development proposals.
London Borough of Bexley Draft Local Plan 2021 (Ref 9.7)	The new Local Plan (due to be adopted shortly) includes a range of guidance on tree protection throughout the Borough including under the following measures: • DP20: Biodiversity and geodiversity in developments; and • DP21: Greening of development.
Guidance	
National Planning Practice Guidance (2021) (Ref 9.15)	Sets out the Government's planning policies for England and provides guidance for planning authorities and developers on the assessment of environmental impact.

Policy / Legislation / Guidance	Description
BS 5837:2012 Trees in Relation to Design, Demolition, and Construction – Recommendations 2012 (Ref 9.21)	The British Standard (BS 5837:2012), details the steps that should be taken to ensure that trees are appropriately and successfully retained when a development takes place.

9.3. BASELINE CONDITIONS AND FUTURE BASELINE

9.3.1. The key sources of desk information on baseline TVIA conditions will be:

- Analysis of Ordnance Survey (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 TVIA Study Area (see **Section 9.4**) including landscape / townscape character assessments, previous EIAs and relevant planning documents; and
- Analysis of online planning designations map, Planning Datamap (**Ref 9.22**).

9.3.2. The key sources of information on baseline AIA conditions will be:

- an arboricultural desk study; and
- a walkover survey of arboricultural features within the AIA Study Area. The walkover survey will collect tree data in line with BS 5837:2012.

9.3.3. A short summary of the TVIA and AIA baseline conditions are presented below. The baseline conditions described align with the Study Areas presented in **Section 9.4**.

BASELINE CONDITIONS

9.3.4. The information gathered and presented within the ES for Riverside 2 will inform the baseline relevant to townscape, visual and arboriculture, where relevant.

Topography

9.3.5. The townscape within and surrounding the Proposed Scheme is generally flat lying, at approximately 2m above Ordnance Datum (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

9.3.6. 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

jetty) 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 the Crossness LNR.

9.3.7. The townscape is largely industrial with numerous industrial estates in the surrounding area, as detailed in **Chapter 2: Site and Proposed Scheme Description**. 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. Located to the north of the Site Boundary, on the opposite bank of the River Thames, is the export facility for the Ford of Britain subsidiary of Ford Motor Company. There are numerous jetties protruding into the River Thames, further details on the jetties are provided in **Chapter 18: Navigation**.

9.3.8. Wind turbines and tall chimney stacks feature throughout the distant townscape. To the south is the A2016 Eastern Way and a railway line.

National Character Areas

9.3.9. National Character Areas (NCAs) area a distinct and recognisable area of character at a national scale.

9.3.10. The Proposed Scheme is located within NCA 81: Greater Thames Estuary. The NCA covers a vast area. Two other NCA are situated within the TVIA Study Area are as follows:

- NCA 113: North Kent Plain is approximately 1km to the south; and
- NCA 111: Northern Thames Basin is approximately 1.4km to the north.

9.3.11. NCA 112: Inner London is situated just outside the TVIA Study Area.

9.3.12. There are no published Townscape Character Areas within LBB, where the Proposed Scheme is situated, or within The London Borough of Havering or The 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

9.3.13. Lesnes Abbey Scheduled Monument and Grade II listed building is situated approximately 1.8km southwest of the Site Boundary.

9.3.14. There are no Registered Parks and Gardens within the TVIA Study Area.

9.3.15. There are three Conservation Areas within the TVIA Study Area which are:

- Crossness Conservation Area, approximately 760m to the west of the Site Boundary;
- 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.

9.3.16. There are no Listed Buildings within the Site Boundary. There are nine Listed Buildings within the TVIA Study Area (**Section 9.4**) which are as follows:

- Jetty Number 4 and approach, formerly at Samuel Williams and Company, Dagenham Dock, approximately 750m to the northwest;
- Workshop Range to southeast of Main Engine House Crossness Pumping Station, approximately 875m to the west;
- Crossness Pumping Station, approximately 990m to the west;
- Bexley College (Former Erith Technical Institute) including attached walls railings and gatepiers, 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.

9.3.17. 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 8: Heritage**.

Public Rights of Way

9.3.18. The England Coast Path ‘Grain to Woolwich’ runs alongside the southern bank of the River Thames and passes through the Site Boundary. The section of the England Coast Path route is also designated as National Cycle Network (NCN) Route 1 connecting Dover and the Shetland Islands and Thames Path (Footpath (FP) 3).

9.3.19. 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 NCN Route 13.

9.3.20. Two sections of the Green Chain Walk pass through the TVIA 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 is situated approximately 1km south of the Site Boundary.

9.3.21. There are three public rights of way (PRoW) **(Ref 9.23)** within the Site Boundary:

- FP2
- FP3
- FP4

9.3.22. There are two further PRoW within close proximity to the Proposed Scheme which are:

- FP1
- FP242

9.3.23. There are no areas of registered Common Land/Open Access Land[15] within the TVIA Study Area.

Landscape Designations

9.3.24. There are no Areas of Outstanding Natural Beauty (AONB), National Parks or Country Parks within the TVIA Study Area. The closest Country Park is Beam Valley Country Park, located approximately 2km north of the Site Boundary.

Green Belt

9.3.25. The Site Boundary is not within an area of Green Belt.

Metropolitan Open Land

9.3.26. Part of the Proposed Scheme is situated within an area of Metropolitan Open Land with areas of 'other open space' at various locations within the Study Area. (**Ref 9.22**).

Visual Designations

9.3.27. There are several Locally Significant Views within London Borough of Bexley 2021 (**Ref 9.12**). 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.

9.3.28. The Proposed Scheme does not fall within the viewing corridor of the London View Management Framework (LVMF) views (**Ref 9.13**).

Arboriculture

9.3.29. There are no tree preservation orders or conservation areas within the Site Boundary. The southern perimeter contains deciduous woodland, which borders the A2016 Eastern Way. No ancient woodland or ancient/veteran trees are located within the Site Boundary.

9.3.30. The closest area of ancient woodland is Lesnes Abbey Woods, located approximately 1.2km southwest of the Site Boundary.

FUTURE BASELINE

9.3.31. Existing premises within the Site Boundary would remain at their current locations should the Proposed Scheme not proceed. These include Riverside 1, Middleton Jetty and the Munster Joinery Warehouse. Riverside 2 (at the time of writing,

[15] Land mapped as Conclusive Registered Common or Access Land under the Countryside Rights of Way (CRoW) Act 2000

construction works for Riverside 2 are being undertaken) would be operational in the future baseline and appear in views throughout the townscape.

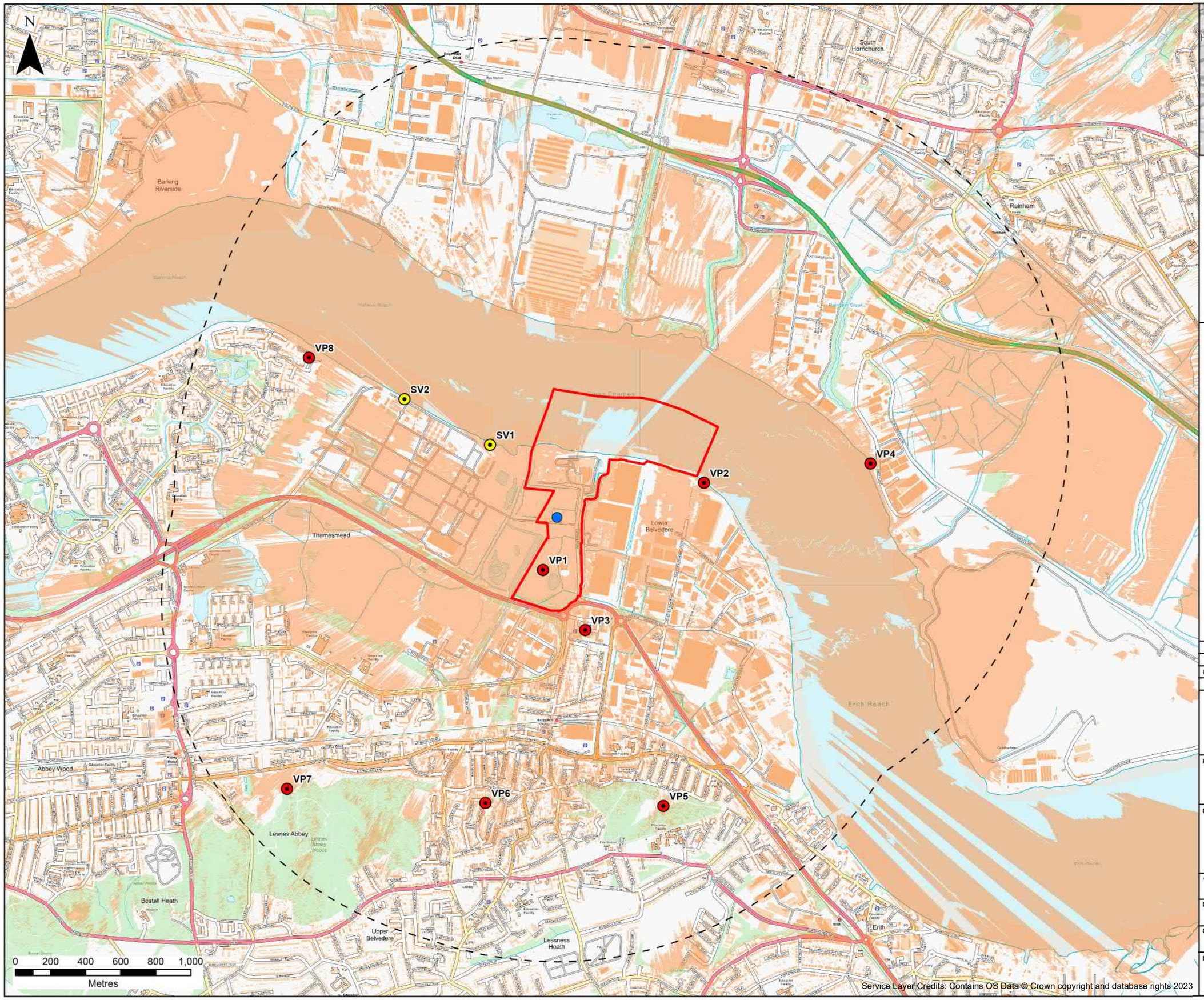
9.4. STUDY AREA

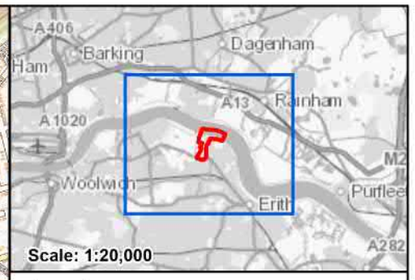
TVIA

9.4.1. A 2km radius TVIA Study Area beyond the Site Boundary will be considered for the assessment of townscape and visual effects. The TVIA Study Area has been determined by a site appraisal, 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.

9.4.2. A preliminary Zone of Theoretical Visibility (ZTV) plan was created based upon an indicative maximum (worst-case scenario) new stacks height of 90m AOD. The ZTV shows the theoretical extent of the area from which the new stacks are likely to be visible. It is important to note that the ZTV demonstrates the worst-case scenario; and, in reality, other built form and other features, such as hedgerows or street trees, are likely to provide additional filtering or reduction of views. The 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. Production of a further digital ZTV will be undertaken to refine the TVIA Study Area as part of the PEIR, if appropriate.

9.4.3. **Figure 9-1** illustrates the preliminary ZTV, location of the Site Boundary for the Proposed Scheme, the 2km TVIA Study Area, and suggested viewpoint locations which are described in **Section 9.8**.





Legend

- Indicative Location of Absorber Column Stack at 90m maximum height
- Site Boundary
- Zones with Theoretical Visibility of the Proposed Scheme
- 2km From Site Boundary
- Sequential Viewpoints
- Representative Viewpoints

ZTV Notes:
The purpose of the Zone of Theoretical Visibility (ZTV) mapping is to inform the field survey work for visual assessment. The ZTV identifies land that, theoretically, is visually connected with the proposal on the basis of a terrain model and the parameters set out below. The extent and nature of specific views towards the Proposed Development is verified through field survey work.

- The ZTV is produced using specialist software package ArcGIS Spatial Analysis tool.
- The ZTV is produced by calculating surface locations visible to target points.
- The observer eye height above the ground level is set at 1.6m.
- For this ZTV analysis one point representing the location of the absorber column stack at 90m maximum height was selected and analysed.
- The ZTV accounts for ground topography on the basis of a model made from 1m LiDAR Digital Surface Model (DSM) height data in the form of a 3D Raster. This height data was Supplied by Defra.
- The ZTV accounts for features on the terrain such as buildings, woodlands, trees or infrastructure.
- The ZTV accounts for the earth curvature.
- The ZTV portrays the visibility of the Proposed Scheme on the basis of if any target point is visible on the Digital Surface Model.

REVISION	DRAWN	CHECKED	APPROVED	DATE
P01	SB	YS	CC	15/03/2023

Final Draft

DESCRIPTION

PROJECT TITLE:

CORY DECARBONISATION PROJECT

DRAWING TITLE:

FIGURE 9-1:
VIEWPOINT LOCATION PLAN

CONFIDENTIALITY: CONFIDENTIAL

DRAWN:	CHECKED:	APPROVED:	AUTHORISED:
SB	YS	CC	CC

SCALE @ A3 SIZE:	DATE:	REVISION:
1:20,000	29/03/2023	P01

DRAWING NUMBER:

70090329-WSP-00-XX-RP-EN-0901

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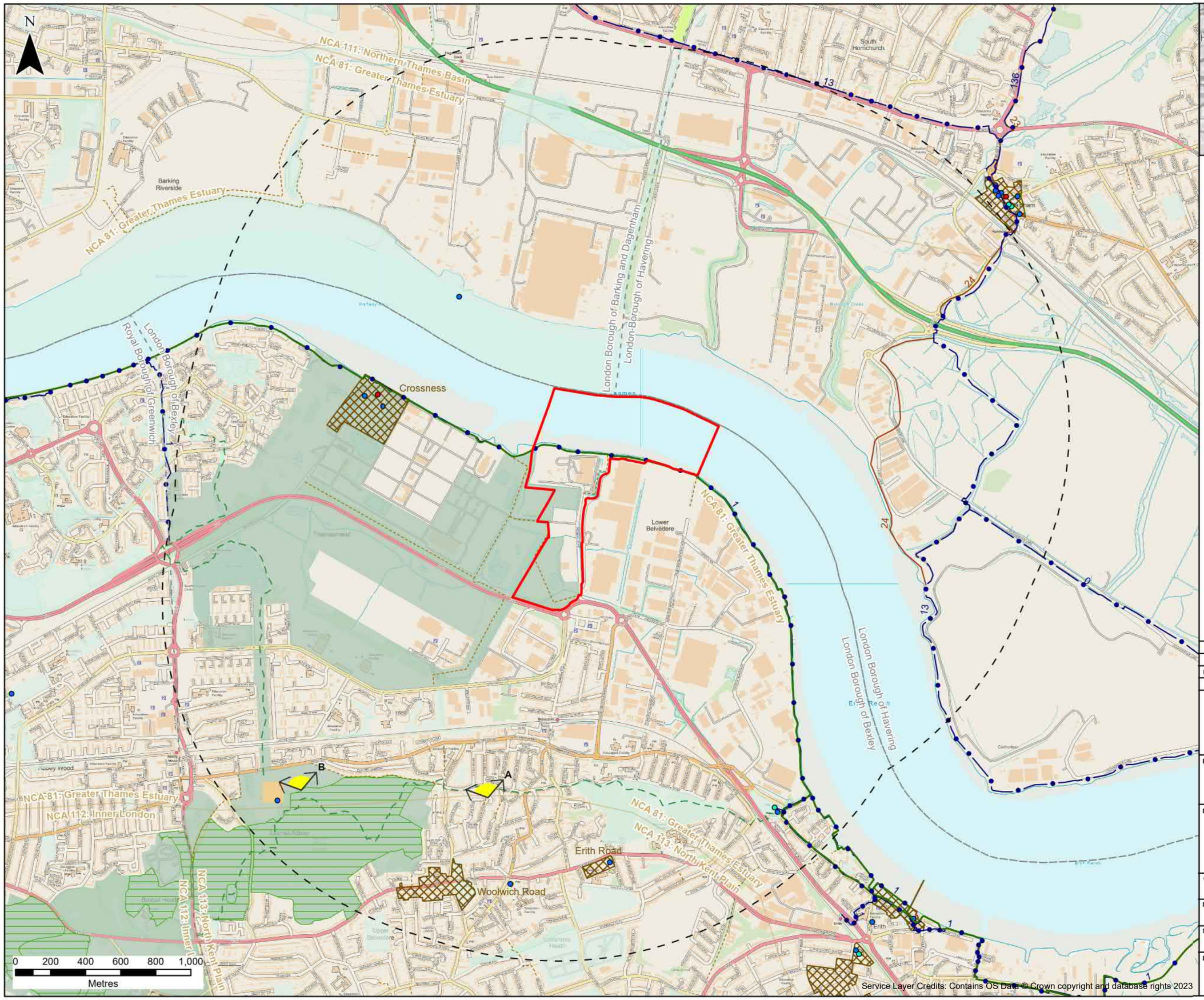
AIA

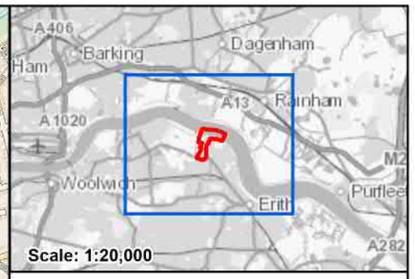
9.4.4. The AIA Study Area will cover the entirety of the Site, and up to a further 15m beyond. The purpose of this 15m area beyond the Site Boundary is to ensure compliance with BS 5837:2012, which recommends that all arboricultural features whose Root Protection Areas (RPAs) and crowns may be impacted are identified and surveyed (**Ref 9.21**). BS 5837:2012 has a maximum RPA radius of 15m, hence the extent of the AIA (**Ref 9.21**).

9.5. SENSITIVE RECEPTORS / RESOURCES

9.5.1. The following sensitive receptors have been identified at this stage (as shown on **Figure 9-2**):

- The following NCAs within the TVIA Study Area:
  - NCA 81: Greater Thames Estuary;
  - NCA 113: North Kent Plain is approximately 1km to the south; and
  - NCA 111: Northern Thames Basin is approximately 1.4km to the north.
- Potential visual receptors, including surrounding residents, users of the promoted recreational routes and PRoW, users of public green space, visitors to heritage features, users of highways, users of LVMF viewpoints, and users of the locally designated viewpoints within the TVIA Study Area. A series of proposed viewpoints which are considered representative of the visual receptors are outlined in **Section 9.8**; and
- Arboricultural features (including trees and hedgerows) within the AIA Study Area.





Legend

- Site Boundary
- 2km From Site Boundary
- Local Authority Boundary

Recreational Routes

- England Coast Path
- National Sustrans Cycle Routes
- London Loop
- Green Chain Walk
- Local Public Right of Way

Landscape Designations and Cultural Heritage

- National Character Areas
- Beam Valley Country Park
- Metropolitan Open Land
- Other Open Space
- Ancient Woodland
- Scheduled Monument
- Conservation Areas
- Grade I (Listed Building)
- Grade II (Listed Building)
- Grade II* (Listed Building)
- LVMF Viewpoints:
  A - Local Panoramic View - Thames River Valley Panorama
  B - Regional View - Canary Wharf Cluster 1

REVISION	DRAWN	CHECKED	APPROVED	DATE
P01	SB	YS	CC	23/02/2023
DESCRIPTION: Final Draft				

PROJECT TITLE:
CORY DECARBONISATION PROJECT

DRAWING TITLE:
FIGURE 9-2:
TOWNSCAPE CONTEXT

CONFIDENTIALITY: CONFIDENTIAL

DRAWN:	CHECKED:	APPROVED:	AUTHORISED:
SB	YS	CC	CC

SCALE @ A3 SIZE:	DATE:	REVISION:
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9.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION PHASE

9.6.1. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- Retention and protection of existing established vegetation where appropriate;
- Mitigation measures will include tree root protection areas as outlined within an Arboricultural Method Statement;
- Within the construction area(s), temporary soil mounds would be utilised to screen views of construction activities and light pollution within the surrounding area;
- The construction programme would be kept to the minimum practicable time to reduce the duration of any townscape and visual impacts. Areas would be cleared for construction as close as possible to works commencing and top soiling, reseeding and planting would be undertaken as soon as practicable after sections of work are complete;
- As far as practicable, plant and material storage areas would be appropriately sited to minimise their townscape and visual impact;
- Construction area(s) would be kept tidy (e.g. free of litter and debris);
- Work during the hours of darkness would be avoided as far as practicable and where necessary directed lighting would be used to minimise light pollution/glare;
- Lighting levels would be kept to a minimum necessary for security and safety; and
- The roads providing access to the construction area(s) would be kept free of excessive dust and mud as far as is reasonably practicable.

OPERATION PHASE

9.6.2. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- Thickening of screening planting vegetation within the Site Boundary through provision of evergreen vegetation and vegetation at a range of heights from ground plane to canopy;
- Additional screening planting vegetation within the Site Boundary;
- Focus on design of the built architectural form and shape as well as colour and materials;
- Design of the site layout to reduce the overall perception of massing; and
- Masterplanning of the site layout to take account of TVIA considerations.

9.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

9.7.1. The potential likely significant effects associated with the construction phase include:

- Effects on the local townscape character to include changes to the urban grain, massing and scale through the introduction of construction activities within the TVIA Study Area;
- Effects on the views available to surrounding residents, users of the promoted recreational routes and PRoW, users of public green space, visitors to heritage features, users of highways and users of the locally designated viewpoints within the TVIA Study Area; and
- Effects on the arboricultural features and encroachment into RPAs within the AIA Study Area.

OPERATION PHASE

9.7.2. The potential likely significant effects associated with the operation phase include:

- Effects on the local townscape character to include changes to the urban grain, massing and scale through the introduction of new built form to previously undeveloped land as well as potential change to sense of place from increased vegetation planting within the TVIA Study Area; and
- Effects on the views available to surrounding residents, users of the promoted recreational routes and PRoW, users of public green space, visitors to heritage features, users of highways and users of the locally designated viewpoints within the TVIA Study Area.

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

9.7.3. The impacts scoped in or out for TVIA and AIA are as follows:

Table 9-3: Scoped In or Out of Further Assessment

Impacts	Phase	Scoped In	Scoped Out	Justification
TVIA				
Potential impacts on topography.	Construction and Operation		✓	The Proposed Scheme is not likely to result in significant changes to the underlying topography.
Potential impacts on NCAs.	Construction and Operation		✓	NCAs cover vast areas that extend far beyond the TVIA Study Area. Further, *"major developments including ports, waste disposal, marine dredging, and prominent power stations plus numerous other industry-related activities"* (**Ref 9.24**) are a key characteristic of the NCA within which the Proposed Scheme is located. Due to the industrial and marine nature of the Proposed Scheme, changes arising from the Proposed Scheme are not expected to give rise to potential impacts on any of the NCAs within the TVIA Study Area.
Potential impacts on townscape character.	Construction and Operation	✓		To ensure that the townscape character of the environment is not adversely impacted by the Proposed Scheme.
Potential effects on LVMF views.	Construction and operation		✓	The Proposed Scheme does not fall within the viewing corridor of the LVMF views.

Impacts	Phase	Scoped In	Scoped Out	Justification
Potential effects on locally designated views.	Construction and Operation	✓		There is the potential for temporary and permanent changes to locally designated views.
Potential effects on visual amenity.	Construction and Operation	✓		There is the potential for temporary and permanent changes to visual amenity.
AIA				
Impacts to existing arboricultural features.	Construction	✓		Impacts may include the removal of arboricultural features and encroachment into RPAs.
Impacts to existing arboricultural features.	Operation		✓	The operation of the Proposed Scheme will not result in loss of or damage to arboricultural features.

9.8. PROPOSED ASSESSMENT METHODOLOGY

9.8.1. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with LBB and the EA.

TVIA

9.8.2. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with the LBB.

9.8.3. For the ES, a detailed townscape and visual assessment will be prepared in accordance with LA107: Landscape and Visual Effects (**Ref 9.17**) and LA104: Environmental Assessment and Monitoring (**Ref 9.18**) and informed by the GLVIA3 (**Ref 9.16**) and the Townscape Character Assessment Technical Information Note (**Ref 9.19**), where the GLVIA3 places greater emphasis on the explanation and justification for assessment criteria and conclusions, appropriate to the Proposed Scheme being assessed. The assessment will consider effects on townscape and visual receptors during summer and winter and at year 1 and year 15.

Establish the Baseline

9.8.4. The ES Chapter will be supported by a detailed baseline review compiled through a broad range of standard data sources, as outlined in **Section 9.3**.

Refine the TVIA Study Area

9.8.5. The TVIA Study Area is defined as the area through which existing townscape character may change or be influenced, or visual receptors potentially impacted as a direct result of the construction and operation of the Proposed Scheme.

9.8.6. The TVIA Study Area for the townscape effects will be refined following guidance provided in the GLVIA3. This will be identified through a combination of ZTV modelling and site work, to refine the TVIA Study Area of 2km. Agreement on the refined TVIA Study Area will be sought with LBB. Beyond the refined TVIA Study Area, the potential for significant townscape or visual effects are not anticipated to arise due to context, scale and nature of the Proposed Scheme.

9.8.7. As outlined in **Section 9.7** effects on NCAs are scoped out of further assessment. It is therefore considered suitable, for the ES, to define townscape character areas at a scale relevant to the TVIA Study Area.

Representative Viewpoints

9.8.8. Following a review of the REP (Riverside 2) ES, preliminary ZTV, site context and a site walkover, a preliminary list of proposed viewpoint locations for the assessment of visual effects has been identified and listed within **Table 9-4** below. LBB was consulted on this list via emails on 31/01/2023 and 03/02/2023, as summarised within **Table 9-4** below. The exact number and location of viewpoints will be refined during the assessment process. Further site visits will be undertaken at these viewpoints, in summer and winter, to take verified photography and to prepare photomontages for the ES. The number and location of these viewpoints will be discussed with LBB.

Table 9-4: 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, NCN Route 1 and FP2 – Viewing Platform	Close-range views from recreational receptors along the nationally designated England Coast Path and nationally designated NCN Route 1. The route is also a local PRoW designated as FP2. Approximately 90m west of the Site Boundary.
SV2	England Coast Path, NCN Route 1 and FP2	Mid-range views from recreational receptors along the nationally designated England Coast Path and nationally designated NCN Route 1. The route is also a local PRoW designated as Footpath 2 (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 Boundary.
VP2	England Coast Path East, NCN Route 1 and FP3	Close-range views from recreational receptors along the nationally designated England Coastal Path and nationally designated NCN Route 1. The route is also a local PRoW designated as FP3. Approximately 65m east of the Site Boundary.
VP3	Clydesdale Way	Mid-range views from residential receptors on Clydesdale Way as well as road users from the local road network.

Viewpoint Reference	Viewpoint Location	Reason For Selection
		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 (**Ref 9.12**), 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 (**Ref 9.12**), as well as recreational receptors of Lesnes Abbey greenspace and recreational visitors to the Lesnes Abbey Scheduled Monument. Approximately 1.65km southwest of the Site Boundary.
VP8	Thamesmead Residential	Long-distance views from residential receptors at Thamesmead. Approximately 1.4km North-West of the Site Boundary.

Significance Criteria

Townscape

9.8.9. For effects on the townscape resource, the assessment of their 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).

9.8.10. Townscape sensitivity will depend on the character of the receiving townscape, the nature of the Proposed Scheme and the type of change. Indicative sensitivity criteria guidance for the townscape resource is set out in Table 3.22 of LA107: Landscape and Visual Effects (**Ref 9.17**).

9.8.11. The magnitude of impact on the townscape resource is the degree of change that would arise if the Proposed Scheme were to be completed (i.e. 'Do Something') as compared with a 'Do Minimum' situation. 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). Indicative criteria guidance is set out in Table 3.24 of LA107: Landscape and Visual Effects **(Ref 9.17)**.

9.8.12. Significance of effect categories are set out in Table 3.7 of LA104: Environmental Assessment and Monitoring **(Ref 9.18)**, using a five-point scale ranging from Neutral to Very Large. These criteria differ slightly from that presented in **Chapter 3: EIA Methodology**.

9.8.13. LA104: Environmental Assessment and Monitoring **(Ref 9.18)** makes it clear that these criteria are not prescriptive, and in making qualified judgements the landscape professional needs to be able to demonstrate to others a consistent and justifiable argument.

Visual

9.8.14. For effects on visual amenity, the assessment of their significance is determined by considering the sensitivity of the visual receptor and the magnitude of impact on visual amenity arising from the Proposed Scheme.

9.8.15. 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 green space or recreational landscapes; people at work; and people travelling along roads or railway lines. Indicative sensitivity criteria guidance for visual amenity is set out in Table 3.41 of LA107: Landscape and Visual Effects **(Ref 9.17)**.

9.8.16. The magnitude of impact on visual amenity is the degree of change that would arise if the Proposed Scheme were to be completed (i.e. 'Do Something') as compared with a 'Do Minimum' situation.

9.8.17. 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). Indicative criteria guidance is set out in Table 3.43 of LA107: Landscape and Visual Effects **(Ref 9.17)**.

9.8.18. As with townscape, significance of effect categories are set out in Table 3.7 of LA104: Environmental Assessment and Monitoring **(Ref 9.18)**.

9.8.19. The effects diagram provided below illustrates the typical relationship between the magnitude of impact and the sensitivity of the receptor for determining the significance of effect.

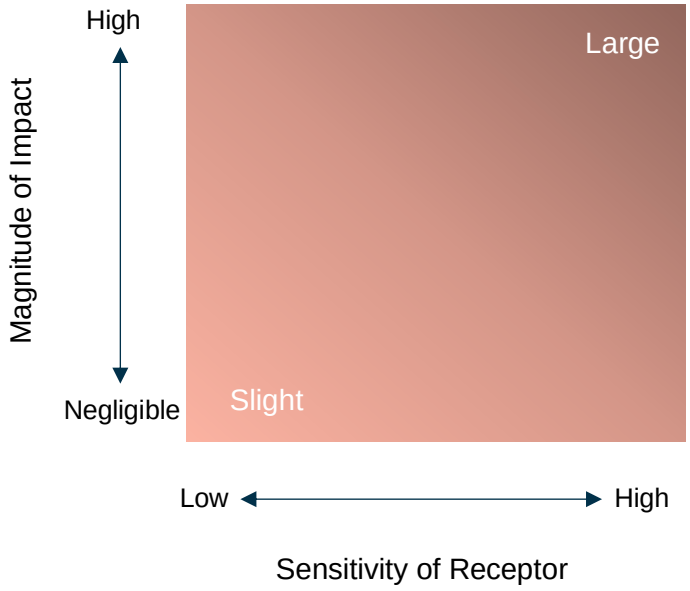

Figure 9-3: Typical Relationship between the Magnitude of Impact and the Sensitivity of the Receptor for Determining Significance of Effect

AIA

9.8.20. The purpose of the AIA is to identify all trees which may be affected by the Proposed Scheme, to assess the impact of the Proposed Scheme upon those trees and to recommend such protection measures as are necessary to ensure the health of retained trees.

9.8.21. The walkover survey will comply with BS 5837:2012 (**Ref 19.21**).

9.8.22. Mitigation measures will be identified in the Arboricultural Method Statement which will accompany the AIA prepared as an appendix to the ES.

9.9. ASSESSMENT LIMITATIONS AND ASSUMPTIONS

9.9.1. The following limitations and assumptions have been identified:

- The baseline conditions have been obtained from a desktop review and site walkover and assumptions have been based on the information available at the time of writing. Further surveys/assessments are required to complete a robust impact assessment to inform the ES.
- The initial viewpoint locations and TVIA Study Area has been informed by the preliminary ZTV which has been generated based on a maximum height of 90m for the new stack only, the ZTV does not take into consideration the scale and massing of the other aspects of the Proposed Scheme, such as the Proposed Jetty.
- The assessment of effects at year 15, following the opening of the Proposed Scheme, will take account of the establishment of trees and shrubs planted as part of primary mitigation embedded within the Proposed Scheme.
- Viewpoints will be taken from publicly accessible locations only. Therefore, when establishing the views from dwellings and/or buildings, this will be based on information from a combination of desk-top studies, site work and professional judgement.
- The ZTV does/will not take into consideration the screening/filtering of views posed by such intervening features such as individual trees and hedgerows, and will not take into consideration the orientation of the viewer i.e. when travelling in a vehicle.

9.10. REFERENCES

Ref 9.1: Department for Energy and Climate Change. (2011). 'National Policy Statement EN-1'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf

Ref 9.2: Department for Energy and Climate Change. (2021). 'National Policy Statement EN-1'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf

Ref 9.3: Ministry of Housing, Communities & Local Government. (2021). 'National Planning Policy Framework (NPPF)'. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

Ref 9.4: Greater London Authority. (2021). 'The London Plan – The Spatial Development Strategy for Greater London'. Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

Ref 9.5: London Borough of Bexley Council. (2012). 'Local Development Framework – Development Plan Document: Bexley Core Strategy'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Core-Strategy.pdf

Ref 9.6: London Borough of Bexley Council. (2004). 'Unitary Development Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-12/Bexley-unitary-development-plan-written-statement-2004.pdf

Ref 9.5: London Borough of Bexley Council. (2012). 'Local Development Framework – Development Plan Document: Bexley Core Strategy'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Core-Strategy.pdf

Ref 9.7: London Borough of Bexley Council. (2021). 'Draft Local Plan: Proposed Submission Document – Regulation 19 Stage'. Available at: https://www.bexley.gov.uk/consultations/draft-local-plan-regulation-19-consultation

Ref 9.8: London Borough of Bexley. (2021). 'Bexley Local Character Study 4th Revision'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-10/Bexley-local-character-study.pdf

Ref 9.9: London Borough of Bexley. (2009). 'Crossness Conservation Area'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Crossness-Conservation-Area-Appraisal-and-Management-Plan.pdf

Ref 9.10: London Borough of Bexley. (2008). 'Erith Road Conservation Area'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Erith-Road-Conservation-Area-Appraisal-and-Management-Plan.pdf

Ref 9.11: London Borough of Bexley. (2008). 'Woolwich Road Conservation Area'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Woolwich-Road-Conservation-Area-Appraisal-and-Management-Plan.pdf

Ref 9.12: London Borough of Bexley. (2021). 'Locally significant views within London Borough of Bexley'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-05/Locally-significant-views-within-london-borough-of-bexley-may-2021.pdf

Ref 9.13: Greater London Authority (2012). London View Management Framework Plan. Available at: https://www.london.gov.uk/programmes-strategies/planning/implementing-london-plan/london-plan-guidance-and-spgs/london-view-management

Ref 9.14: Council of Europe. (2000). 'European Landscape Convention'. Available at: https://www.coe.int/en/web/landscape

Ref 9.15: Ministry of Housing, Communities and Local Government and Department for Levelling Up, Housing and Communities. (2021). 'Planning Practice Guidance'. Available at: https://www.gov.uk/government/collections/planning-practice-guidance

Ref 9.16: Landscape Institute and Institute of Environmental Management and Assessment. (2013). 'Guidelines for Landscape and Visual Impact Assessment (GLVIA) 3rd Edition. London: Routledge'. Available at: https://www.torbay.gov.uk/media/15326/68-guidelinesforlandscapeandvisualimpactassessment-_3rd-edition_2013.pdf

Ref 9.17: Highways England, Transport Scotland, Welsh Government and Department for Infrastructure. (2020). 'LA 107 Landscape and visual effects revision 2'. Highways England.

Ref 9.18: Highways England, Transport Scotland, Welsh Government and Department for Infrastructure. (2020). 'LA 104 Environmental assessment and monitoring revision 1'. Highways England.

Ref 9.19: Landscape Institute. (2018). 'Townscape Character Assessment Technical Information Note 05/2017, Revised April 2018'. Available at: https://www.landscapeinstitute.org/technical-resource/townscape/

Ref 9.20: Landscape Institute. (2019). 'Visual Representation of Development Proposals - Technical Guidance Note 06/2019'. Available at: https://www.landscapeinstitute.org/visualisation/

Ref 9.21: BS 5837: 2012 Trees in relation to design, demolition and construction – Recommendations. Available to purchase at: https://www.bsigroup.com/en-GB/standards/

Ref 9.22: London Assembly. 'Planning Datamap'. Available at: https://apps.london.gov.uk/planning/

Ref 9.23: London Borough of Bexley. 'Public Rights of Way Map'. Available at: https://bexleycouncil.maps.arcgis.com/apps/webappviewer/index.html?id=21c7b3240e53496ab9ef46632ba84d26

Ref 9.24: Natural England. (2014). 'National Character Area profiles'. Available at http://publications.naturalengland.org.uk/publication/4531632073605120?category=587130

10. WATER ENVIRONMENT AND FLOOD RISK

10.1. INTRODUCTION

10.1.1. This chapter considers the impacts of the Proposed Scheme on the water environment and flood risk during construction and operation, and any potential significant effects. It sets out the proposed methodology for the water environment and flood risk assessment and identifies those impacts that can be scoped out of the assessment. Where necessary further assessment will be presented in the ES.

10.2. POLICY, LEGISLATION, AND GUIDANCE

10.2.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is as stated in **Table 10-1**.

Table 10-1: Water Environment and Flood Risk – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011 (Ref 10.1)	Sets out the Government's policy for delivery of major energy infrastructure and will be the primary basis for decision making. NPS EN-1 (paragraph 5.16.1) recognises that infrastructure can have adverse effects on the water environment. It states that the effects could lead to adverse impacts 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 WFD. Paragraph 5.16.2 states that where developments are likely to have effects on the water environment, applicants 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 environment and impacts on protected water bodies and areas.

Policy / Legislation / Guidance	Description
	Section 5.7: Flood Risk of NPS EN-1 details 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). In determining an application for development consent, the Secretary of State (SoS) should be satisfied that, where relevant, (Paragraph 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);* • *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;*

Policy / Legislation / Guidance	Description
	• *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 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".*
Draft Overarching National Policy Statement for Energy EN-1 2021 (Ref 10.2)	The Government has published a draft update to the Overarching National Policy Statement for Energy. For flood risk and water quality the 2021 Draft NPS EN-1 is largely the same as the 2011 document.
National Planning Policy Framework (NPPF) 2021 (Ref 10.3)	Presents the Government's planning policies for England and Wales and how these are expected to be applied. Section 14 of the NPPF details the requirements for FRAs. 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 (Ref 10.4)	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 / Legislation / Guidance	Description
	Policies SI 12 to SI 14 detail how the Proposed Scheme will need to take into consideration the local flood risk within and surrounding the Site Boundary and use sustainable drainage systems and highlight the importance and strategic role of the River Thames.
London Borough of Bexley Core Strategy 2012 (Ref 10.5)	The Core Strategy sets out the Council's long-term vision for development in the borough. It aims to support a strong, sustainable and cohesive community. Policy CS01 outlines how sustainable development can be achieved and Policy CS 08 sets out how the Proposed Scheme should minimise the local flood risks associated with surface water and fluvial sources. The ES for the Proposed Scheme include an FRA as an appendix which will assess local flood risks.
London Borough of Bexley Unitary Development Plan (UDP) 2004 (Ref 10.6)	The main purpose of the Unitary Development Plan is to provide a framework for guiding development, and to show how land will be used as a resource for achieving the Council's wider objectives. The Unitary Development Plan contains policies relevant to the water environment and flood risk. However, these policies have been superseded by the Bexley Core Strategy. Therefore, Bexley UDP will not be considered further in this chapter
London Borough of Bexley Draft Local Plan 2021 **(Ref 10.7)**	The new Local Plan is awaiting adoption and will then replace the Bexley Core Strategy and Saved UDP policies 2012. The draft Local Plan details the flood risk management considerations for developments in Policy DP32: Flood Risk Management and Policy DP33: Sustainable Drainage Systems.
Bexley Strategic Flood Risk Assessment Level-1 2019 (Ref 10.8)	The purpose of Bexley Strategic Flood Risk Assessment (SFRA) Level-1 was to collate and analyse the most to date readily available flood risk information for all sources of flooding and provide an overview of the flood risk issues across Bexley.

Policy / Legislation / Guidance	Description
	The SFRA highlights several designated main rivers within the Site Boundary under the jurisdiction of the Environment Agency. The SFRA also identifies that the Site is protected by flood defences located along the River Thames.
Bexley Strategic Flood Risk Assessment Level-2 2020 (Ref 10.9)	The Bexley Strategic Flood Risk Assessment Level-2 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.
Legislation	
Flood and Water Management Act 2010 (Ref 10.10)	The Flood and Water Management Act created the role of the Lead Local Flood Authority (LLFA) to take responsibility for leading the co-ordination of local flood risk management in their areas. In accordance with Act: • the Environment Agency is responsible for the management of risks associated with Main Rivers, 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. 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 surface water 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	Under the Environmental Permitting Regulations (EPR), 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

Policy / Legislation / Guidance	Description
Exit) Regulations 2018 (Ref 10.11)	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 EPR 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. The River Thames is the closest main river to the Proposed Scheme, located within the Site Boundary.
Land Drainage Act 1991 (Ref 10.12)	Lead Local Flood Authorities and Internal Drainage Boards (IDBs) 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 in order to ensure that local flood risk is not increased. The Land Drainage Act also sets out the maintenance responsibilities riparian owners have to reduce local flood risks.
The Water Environment (Water Framework Directive) (England and Wales) Regulations (the 'Water Framework Regulations') (2017) (Ref 10.13)	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 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

Policy / Legislation / Guidance	Description
	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 a number of other 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 also 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.
The Water Resources Act 1991 (Ref 10.14)	The Water Resources Act aims to regulate water resources, water quality and pollution and flood defence within the UK to minimise pollution of water. Part II of the Act deals with 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 which addressed the control of water pollution, including the discharge consent system and water pollution offences, regulated by the Environment Agency, however, the EPR currently define the regime on water discharge permits. Part IV deals with flood defence 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.

Policy / Legislation / Guidance	Description
The Environmental Damage (Prevention and Remediation) (England) Regulation 2015 (Ref 10.15)	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 Groundwater (England and Wales) Regulations 2009 (Ref 10.16)	The Groundwater Regulations implement in England and Wales community legislation on pollution of groundwater. They provide rules for the granting by the Environment Agency of a permit under these Regulations, consent under Section 91(8) of the Water Resources Act and (with exceptions) an environmental permit under the EPR. In addition, the regulations create an offence of discharge of a hazardous substance or non-hazardous pollutant without a permit, provide for powers of enforcement of the Environment Agency and prescribe penalties for offences committed under these regulations.
The Water Act 2003 (Ref 10.17)	The Water Act is an update to the Water Recourses Act 1991 and aims to provide a modern, efficient and robust legislative framework to facilitate both

Policy / Legislation / Guidance	Description
	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.
The Water Act 2014 (Ref 10.18)	The Water Act 2014 is an update to the Water Recourses 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 Boundary.
The Groundwater (Water Framework Directive) (England) Direction 2016 (Ref 10.19)	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 (Ref 10.20)	The Environment Act 2021 provides a framework for environmental protection. Section 98 specifies that measures outlined in Schedule 14, to make provision for biodiversity gain to be a condition of planning permission in England, are to apply. 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 / Guidance	Description
Guidance	
National Planning Practice Guidance (2021) (Ref. 10.21)	Explains the processes and tools that can be used through the planning system in England. NPPG advises how to take account of and address the risks associated with flooding and coastal change in the planning process.

10.3. BASELINE CONDITIONS

BASELINE

10.3.1. The key sources of information on baseline the water environment and flood risk will be:

- Environment Agency online Flood Map for Planning (**Ref 10.22**);
- Environment Agency online Long Term Risk of Flooding (**Ref 10.23**);
- Environment Agency online Flood Risk from Reservoirs Map (**Ref 10.24**);
- Environment Agency Recorded Flood Outlines Map (**Ref 10.25**);
- Environment Agency online Catchment Data Explorer (**Ref 10.26**);
- Environment Agency Thames River Basin District River Basin Management Plan (**Ref 10.27**);
- Ordnance Survey Mapping (**Ref 10.28**);
- Environment Agency LiDAR Digital Terrain Model (**Ref 10.29**);
- DEFRA 'Magic Map' Online GIS Portal (**Ref 10.30**);
- British Geological Survey (BGS) Geology of Britain Viewer (**Ref 10.31**);
- BGS Geoindex Online Database (**Ref 10.32**);
- Google Maps, Aerial Imagery (**Ref 10.33**);
- National Library of Scotland, Historical Mapping (**Ref 10.34**);
- Flood Estimation Handbook Web Service (**Ref 10.35**);
- Enviro+Geo Insight Groundsure Report (**Ref 10.36**;
- London Borough of Bexley SFRA (**Ref 10.8 and 10.9**); and
- Cory Riverside Energy Park. (2018). 'Environmental Statement Chapter 12: Hydrology, Flood Risk and Water Resources' and associated Technical Appendices (**Ref 10.37**).

10.3.2. A short summary of the baseline conditions are presented below.

10.3.3. The information gathered and presented within the ES for Riverside 2 will inform the baseline relevant to water environment and flood risk, where relevant.

Surface Water Features

10.3.4. There are several main rivers, ordinary watercourses and ponds located within the Site Boundary and Study Area, as summarised below. The Study Area is described in **Section 10.4** below.

10.3.5. The Main Rivers located within the Study Area are labelled in **Figure 10.1** and listed below:

- River Thames (located within the Site Boundary);
- Mulberry Way River and Tributaries (located within the Site Boundary);
- Belvedere Stream (located within the Site Boundary);
- Great Breach Lagoon (located approximately 15m west from the Site Boundary);
- Great Breach Dyke North (located approximately 20m west from the Site Boundary, in culvert); and
- Great Breach Dyke West (located approximately 160m west from the Site Boundary).

10.3.6. The ordinary watercourses located within the Study Area are labelled in **Figure 10.1: Surface Water Features** and listed below:

- North Dyke (located within the Site Boundary);
- Stable Paddock Ditch (located within the Site Boundary);
- West Paddock Ditch (located within the Site Boundary);
- Cory Field South Ditch (located within the Site Boundary);
- Iron Mountain Ditch (located within the Site Boundary);
- Norman Road Stream (located within the Site Boundary);
- 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); and
- Reedbed Ditch 2 (located approximately 260m west from the Site Boundary).

10.3.7. The ponds located within the Study Area are labelled in **Figure 10-1: Surface Water Features** and are listed below:

- Pond 1 (located within the Site Boundary);
- Pond 2 (located within the Site Boundary);
- Pond 3 (located within the Site Boundary);
- Pond 4 (located within the Site Boundary);
- Pond 5 (located within the Site Boundary);
- Pond 6 (located within the Site Boundary);

- Great Breach Pond (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);
- Crossness Pond 1 (located approximately 140m from the Site Boundary);
- Education Pond (located approximately 190m from the Site Boundary); and
- Wader Scrape (located approximately 200m from the Site Boundary).

10.3.8. 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 north-west (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 PS Outfall). The location of the Environment Agency Pumping Stations and outfalls are shown on **Figure 10.2: Surface Water Features Study Area**.

10.3.9. An active licenced surface water abstraction point is located 15m to the west of the Site Boundary abstracts from the Great Breach Dyke North, for use by Thames Water as make up/top up water.

N

River Thames

Great Breach Outfall

MR12

Great Breach pond

Great Breach Pumping Station

OW10

OW1

OW3

Wader Scrape

OW6

OW4

OW12

OW7

Education Pond

MR1

OW11

NORMAN ROAD

MR4

MR5

OW14

Lower Belvedere

OW8

OW2

OW9

OW5

Crossness Pond 3

Crossness Pond 4

MR2

Crossness Pond 1

Crossness Pond 2

Pond 5

Pond 3

Pond 4

Pond 6

Pond 2

Pond 1

MR11

A2016

OW13

CLYDESDALE WY

ANDERSON WAY

MR3

CRABTREE MANORWAY NORTH

FISHER'S WAY

MR7

MR6

JENNINGTREE WAY

MULBERRY WAY

ST THOMAS ROAD

Green Level Pumping Station

Green Level Outfall

LITTLE BRIGHTS ROAD

HAILEY ROAD

NORMAN ROAD

NORTH ROAD

POPPY CLOSE

MR8

MR9

MR10

0 75 150 225 300

Metres

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\\uk.wspgroup.com\central data\Projects\70090xxx\70090329 - Cory CCUS DCO Delivery\03 WIP\GIS\13_GSS\132_GIS\ArcGIS\MXDs\Figure 10-1_Surface Water Features.mxd

Watercourse Key

Label	Name
MR1	Norman Road River
MR2	Great Breach Lagoon
MR3	Mulberry Way River
MR4	Norman Road Stream
MR5	Belvedere Stream
MR6	Gliray Plant
MR7	Crabtree Stream
MR8	Anderson Way Stream
MR9	Ocardo Stream
MR10	Bronze Age Stream
MR11	Great Breach Dyke West
MR12	Great Breach Dyke North Culvert
OW1	Hide Dyke
OW2	Reedbed Dyke
OW3	West Paddock Ditch
OW4	North Dyke
OW5	Horse Head Ditch
OW6	Stable Paddock Ditch
OW7	Iron Mountain Ditch
OW8	Reedbed Ditch 1
OW9	Reedbed Ditch 2
OW10	Great Breach Ditch
OW11	Cory Field South Ditch
OW12	Iron Mountain Ditch
OW13	Eastern Way Ditch
OW14	Lidl Ditch

Legend

- Pumping Stations
- Outfall
- Main Rivers
- Ordinary Watercourses
- Wetland
- Ponds
- Site Boundary

REVISION	DRAWN	CHECKED	APPROVED	DATE
P00	AB	JF	RA	17/04/2023
DESCRIPTION: SECOND DRAFT ISSUE				

PROJECT TITLE:

CORY DECARBONISATION PROJECT

DRAWING TITLE:

FIGURE 10-1
SURFACE WATER FEATURES

CONFIDENTIALITY: PUBLIC

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AB	JF	RA	JW

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DRAWING NUMBER:

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N

River Thames

Great Breach Outfall

Great Breach Pumping Station

MR12

OW4

OW12

OW3

OW1

OW6

OW7

MR1

OW11

OW14

MR4

MR5

Lower Belvedere

OW8

OW2

MR2

OW9

OW5

OW13

MR7

MR6

MR3

MR11

MR8

Green Level Pumping Station

Green Level Outfall

MR9

MR10

Erith Reach

Education Facility

Belvedere

Education Facility

Education Facility

0 2.5 5 7.5 10

Kilometres

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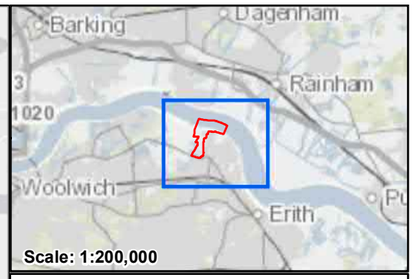

Watercourse Key

Label	Name
MR1	Norman Road River
MR2	Great Breach Lagoon
MR3	Mulberry Way River
MR4	Norman Road Stream
MR5	Belvedere Stream
MR6	Gliray Plant
MR7	Crabtree Stream
MR8	Anderson Way Stream
MR9	Ocardo Stream
MR10	Bronze Age Stream
MR11	Great Breach Dyke West
MR12	Great Breach Dyke North Culvert
OW1	Hide Dyke
OW2	Reedbed Dyke
OW3	West Paddock Ditch
OW4	North Dyke
OW5	Horse Head Ditch
OW6	Stable Paddock Ditch
OW7	Iron Mountain Ditch
OW8	Reedbed Ditch 1
OW9	Reedbed Ditch 2
OW10	Great Breach Ditch
OW11	Cory Field South Ditch
OW12	Iron Mountain Ditch
OW13	Eastern Way Ditch
OW14	Lidl Ditch

Legend

- Pumping Stations
- Outfall
- Main Rivers
- Ordinary Watercourses
- Surface Water Study Area
- Coastal Study Area
- Groundwater Study Area
- Wetland
- Ponds
- WFD Transitional Water Bodies
- Site Boundary

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CORY DECARBONISATION PROJECT

DRAWING TITLE:
FIGURE 10-2
WATER ENVIRONMENT STUDY AREA

CONFIDENTIALITY: PUBLIC

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\\uk.wspgroup.com\central data\Projects\70090xxx\70090329 - Cory CCUS DCO Delivery\03 WIP\GIS\13_GSS\132_GIS\ArcGIS\MXDs\Figure 10-2_Water Environment Study Area.mxd

Groundwater

10.3.10. The underlying geology of the Proposed Scheme is described in **Chapter 16: Ground Conditions and Soils**.

10.3.11. With regards to groundwater the superficial deposits underlying the Site Boundary are classified predominately as a Secondary Undifferentiated aquifer with a small area classified as Unproductive. The bedrock geology within the Site Boundary is classified as Secondary A (Lambeth Group) and Unproductive (London Clay Formation) (**Ref 10.36**).

10.3.12. Groundwater may be present as discontinuous pockets of perched water within the Made Ground onsite. The prevailing Groundwater flow in the main bedrock aquifer (i.e. at depth) within the Site Boundary is assumed to flow towards the River Thames. The groundwater levels typically range between 4.5m and 10m BGL (-3.07 and -8.98mAOD) (**Ref 10.31**). A range in groundwater level data is to be expected due to variability in the River Thames tidal influence and also seasonality variations.

10.3.13. The risk of groundwater flooding across the Site is categorised as being moderate (**Ref 10.36**).

10.3.14. There are two groundwater abstractions located within 2km of the Site Boundary. The closest is approximately 1km southeast of the Site Boundary for the use of mineral washing with an annual abstraction volume of 40,000m^3 (**Ref 10.36**). The second is located approximately 2km southeast of the Site Boundary for use in commercial/ industrial and public services (including drinking water) with an annual abstraction volume of 250,000m^3 (**Ref 10.36**).

10.3.15. No Groundwater Dependant Terrestrial Ecosystems (GWDTEs) are situated near enough to the Site Boundary to be impacted by the Proposed Scheme.

Water Framework Directive (WFD)

10.3.16. There is one WFD-designated 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, physico-chemical and hydromorphological quality elements. The area of the Site Boundary 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.

Coastal Processes

10.3.17. 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 6m. Tide levels can be higher during more extreme tidal events such as storm surges.

10.3.18. 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.

10.3.19. 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

10.3.20. A surface water drainage strategy is in place for Riverside 1 (information on existing drainage this part of the Site Boundary is limited) and a strategy has been developed for Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken). There are surface water features (see section above for details) and ditches adjacent to Norman Road, which receive surface water runoff from the surrounding area. A surface water drainage strategy will be prepared for the Proposed Scheme and will be submitted as an appendix to the ES.

10.3.21. There are no springs known to be situated in proximity to the Site Boundary.

Flood Risk

10.3.22. The Environment Agency Flood Map for Planning (**Ref. 10.22**) presents the flood risk associated with the Site Boundary. The map indicates that the Site Boundary is located within Flood Zone 3. This indicates that the Site Boundary is located within the possible tidal flood extent of the 1 in 200-year event (0.5% Annual Probability of Exceedance event - APE), excluding the presence of flood defences. However, there are Environment Agency maintained flood defences located along the River Thames, parts of which are within the Site Boundary. These currently provide the Site with a reduction in local flood risk.

10.3.23. The Environment Agency's Long Term Flood Risk of Flooding map (**Ref. 10.23**) shows the flood risk from surface water sources and is likely based upon 2010 LiDAR data of the Site Boundary. The surface water flood risk mapping indicates the presence of a watercourse within the Site Boundary which no longer exists due to the development of Riverside 1. There is no evidence that the LLFA has prepared local mapping to supersede what the Environment Agency produced in 2013. Therefore, the predicted flood risk from surface water sources as shown on the Environment Agency mapping is not representative of the current flood risk. The flood risk information will be updated as part of the FRA prepared for the Proposed Scheme.

FUTURE BASELINE

10.3.24. 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 groundwater, WFD and coastal processes. However, it is considered that Riverside 2 is likely to change the baseline in relation to:

- surface water features; and
- flood risk.

10.3.25. A summary of each of the likely changes is provided below.

Surface Water Features

10.3.26. Riverside 2 incorporates mitigation measures (as detailed within the Chapter 12: Hydrology Flood Risk and Water Resources of the 2018 ES (EN010093)) (**Ref 10.37**) to ensure that there are no significant effects on surface water features within or adjacent to the Riverside 2 Site Boundary, once it is operational.

Flood Risk

10.3.27. Riverside 2 incorporates mitigation measures (as detailed within the Chapter 12: Hydrology Flood Risk and Water Resources of the 2018 ES (EN010093)) (**Ref. 10.37**) to ensure that there are no significant effects on flood risk as a result of the operation of Riverside 2.

10.3.28. As a result of climate change the future baseline would deteriorate from its current baseline, with an increasing frequency and depths of fluvial, surface water and tidal flooding.

10.3.29. Fluvial, surface water and tidal flood risk is expected to increase as a result of the impacts of climate change which are predicted to result in increased sea levels, greater tide locking, higher peak fluvial flows, and more intense rainfall events. The Environment Agency's Flood Risk Assessments Climate Change Allowances (**Ref 10.38**) for the London Management Catchment peak river flow allowances anticipated are presented in **Table 10-2** and sea level allowances for the Southeast and River Thames (**Ref 10.38**) are provided in **Table 10-3**.

Table 10-2: London Management Catchment Peak River Flow Allowances

Epoch	Central (%)	Higher (%)	Upper (%)
2020s	10	14	26
2050s	7	14	30
2080s	17	27	54

Table 10-3: Sea Level Allowances for the Southeast and River Thames for Each Epoch in mm for Each Year (based on a 1981 to 2000 baseline)

Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)
Higher Central	5.7	8.7	11.6	13.1
Upper End	6.9	11.3	15.8	18.2

10.4. STUDY AREA

10.4.1. Study Areas have been identified for surface water features, groundwater, WFD, coastal processes and flood risk. A description of each of the Study Areas is provided in the following sections. The Study Areas will be discussed, and agreement sought with, the LLFA, PLA (Port of London Authority), the Environment Agency and the MMO.

SURFACE WATER FEATURES

10.4.2. The Site Boundary is located within a discrete surface water catchment, which is understood to be controlled by two Environment Agency Pumping Stations that outfall to the River Thames. 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. This will be reviewed as part of the PEIR.

GROUNDWATER

10.4.3. 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

10.4.4. The Study Area for the WFD assessment is the Thames Middle Water Body (GB530603911402); the only designated water body in the Site Boundary.

COASTAL PROCESSES

10.4.5. The coastal process Study Area is the Site Boundary, this will be reviewed as a result of the coastal modelling which will be undertaken as detailed in **Section 10.8**.

FLOOD RISK

10.4.6. 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.

10.4.7. The Flood Risk Assessment will be supported by a surface water drainage strategy, which will be limited to the Site.

10.5. SENSITIVE RECEPTORS

10.5.1. **Table 10-4** shows the sensitive receptors identified.

Table 10-4: Sensitive Receptors

Receptor	
Main Rivers	River Thames
	Mulberry Way River and Tributaries
	Belvedere Steam
	Great Breach Lagoon
	Great Breach Dyke North
	Great Breach Dyke West
Ordinary Watercourses	North Dyke
	Stable Paddock Ditch
	West Paddock Ditch
	Cory Field South Ditch
	Iron Mountain Ditch
	Norman Road Ditch
	Horse Head Ditch
	Great Breach Ditch
	Reedbed Dyke
	Reedbed Ditch 1
	Reedbed Ditch 2
Ponds	Pond 1
	Pond 2
	Pond 3
	Pond 4
	Pond 5
	Pond 6

Receptor	
	Great Breach Pond
	Crossness Pond 2
	Crossness Pond 3
	Crossness Pond 4
	Crossness Pond 1
	Education Pond
	Wader Scrape
Crossness Local Nature Reserve (partially located within the Site Boundary)	
Site users e.g., site visitors, and staff	
Thanet Sand and Lambeth Group (bedrock) Secondary A aquifer	
Alluvium (superficial deposit) Secondary Undifferentiated aquifer	
Abstractions (licenced and unlicenced)	

10.6. DESIGN, MITIGATION, AND ENHANCEMENT

CONSTRUCTION PHASE

10.6.1. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- A Code of Construction Practice (CoCP) including, measures to protect both surface and groundwater quality, and other water environment and flood risk aspects;
- 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;
- Appropriate pollution prevention measures will be applied during all construction activities;
- Appropriate construction techniques will be used to minimise potential effects on groundwater; and
- Obtaining of appropriate groundwater abstraction licences for any construction phase dewatering activities, if required.

OPERATION PHASE

10.6.2. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may 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 flood sensitive equipment could be raised above the breach flood level.
- Any wastewater generated by the Proposed Scheme will be treated at appropriate waste water treatment plants as described in **Chapter 2: Description of the Proposed Scheme.**
- Any liquid waste products including amine-based solvent will be treated appropriately. The method for treating the liquid waste products will be developed as the design progresses and will be discussed and agreement sought with the LLFA, PLA and the EA as appropriate.
- The Proposed Scheme design will include appropriate drainage systems and attenuation, in accordance with the requirements of the LLFA and Environment Agency (detailed in the surface water drainage strategy) and in line with the SuDS Manual (**Ref 10.39**).
- Surface water runoff generated in the impermeable areas of the Proposed Watercourses will be diverted if required to ensure no loss of their existing capacity.
- Water discharged to the water environment from the operation of the Proposed Scheme will be within the Environmental Quality Standards (EQS) limits for the receiving surface water features.
- All chemicals / potential contaminants to the water environment will be stored appropriately and in accordance with the relevant regulations.
- An Emergency Preparedness and Response Plan would be developed and implemented should the defences breach or surface water flooding occur.

10.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

10.7.1. The potential likely significant effects associated with the construction phase include:

- quality of the surface water features;
- quantity of surface water features / flows;
- quality of groundwater and aquifers;
- quality of groundwater flows and levels;
- biological, physico-chemical and hydromorphological quality elements of the WFD designated water body (Thames Middle Water Body);
- sediment transport regime;
- flood risk associated with main rivers;
- flood risk associated with ordinary watercourses;

- flood risk associated with ponds; and
- flood risk to Site and surrounding users (e.g., site visitors and staff).

OPERATION PHASE

10.7.2. The potential likely significant effects associated with the operation phase include:

- quality of surface water resources;
- quantity of surface water features / flows;
- quality of groundwater flows and levels;
- biological, physico-chemical and hydromorphological quality elements of the WFD designated water body (Thames Middle Water Body);
- sediment transport regime;
- flood risk associated with main rivers;
- flood risk associated with ordinary watercourses;
- flood risk associated with ponds; and
- flood risk to Site and surrounding users (e.g., site visitors and staff).

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

10.7.3. The impacts scoped in or out for the water environment and flood risk assessment are presented in **Table 10-5**.

Table 10-5: Water Environment - Scoped In or Out of Further Assessment

Impacts	Phase	Scoped In	Scoped Out	Justification
Quality of surface water features	Construction and Operation	✓		Construction and operation of the Proposed Scheme has the potential to impact the quality of surface water features from increased pollution risk.
Quantity of surface water features / flows	Construction and Operation	✓		Construction and operation of the Proposed Scheme have the potential to impact the quantity of surface water features (in terms of number of features and flows / water balance). The source of the water supply for the Proposed Scheme during operation is yet to be determined. The options being considered are described in **Chapter 2: Site and Proposed Scheme Description**.
Groundwater quality –Thanet Sand and Lambeth Group (bedrock) Secondary A aquifer and Alluvium (superficial deposit) Secondary Undifferentiated aquifer	Construction	✓		Pollution risk from spillages, material storage and turbidity have the potential to impact aquifer quality.
	Operation		✓	The risk of effects during the operation of the Proposed Scheme is proposed to be scoped out on the basis that there would be limited

Impacts	Phase	Scoped In	Scoped Out	Justification
				potential for pollution risk based on the standard mitigation measures that would be applied to operation of the Proposed Scheme.
Impacts to groundwater flows and levels – Thanet Sand and Lambeth Group (bedrock) Secondary A aquifer and aquifer Alluvium (superficial deposit) Secondary Undifferentiated aquifer	Construction and Operation	✓		Temporary dewatering during construction and the installation of below ground structures could potentially impact groundwater levels and flows in the medium and long term.
Biological, physico-chemical and hydromorphological quality elements of the WFD designated water body (Thames Middle Water Body)	Construction and Operation	✓		Modification works to Main Rivers (River Thames) have the potential to temporarily or permanently impact the biological, physico-chemical and hydromorphological quality of the watercourses located within the Site Boundary.
Biological, physico-chemical and hydromorphological quality elements of the water features which are not WFD designated	Construction and Operation		✓	Impacts to the Thames Middle Waterbody through connectivity are expected to be minimal, due to the best practice measures that will be incorporated in the design of the Proposed Scheme, therefore a WFD Screening Assessment for undesignated waterbodies is not considered to be required.

Impacts	Phase	Scoped In	Scoped Out	Justification
Biological, physico-chemical and hydromorphological quality elements of main rivers	Construction and Operation	✓		Modification works to Main Rivers (River Thames) have the potential to temporarily or permanently impact the biological, physico-chemical and hydromorphological quality of the watercourses located within the Site Boundary. Impacts on other main rivers will be confirmed during the PEIR / assessment as the design of the Proposed Scheme remains ongoing.
Biological, physico-chemical and hydromorphological quality elements of ponds	Construction and Operation	✓		These impacts could have the potential to temporarily or permanently impact the biological, physico-chemical and hydromorphological quality of the watercourses located within the Site Boundary.
Sediment Transport Regime	Construction and Operation	✓		The construction of the Proposed Jetty and maintenance dredging during operation is likely to change the hydrodynamic (flows) and sediment transport regime (scour) within this localised section of the River Thames.
Flood risk associated with main rivers	Construction and Operation	✓		Modifications works to main rivers have the potential to temporarily or permanently impact the capacity of the watercourses located within the Site Boundary.

Impacts	Phase	Scoped In	Scoped Out	Justification
Flood risk associated with ordinary watercourses	Construction and Operation	✓		Modifications works to ordinary watercourses have the potential to temporarily or permanently impact the capacity of the watercourses located within the Site Boundary.
Flood associated with ponds	Construction and Operation	✓		Construction and operation of the Proposed Scheme has the potential to increase the rate and volume of surface water runoff generated in the area that may increase the risk of flooding within ponds.
Flood risk to Site and surrounding users (e.g., site visitors and staff)	Construction and Operation	✓		Construction and operation of the Proposed Scheme may temporarily or permanently reduce the capacity of the existing floodplain storage and / or impact the existing flood flows. Construction and operation of the Proposed Scheme has the potential to increase the rate and volume of surface water runoff generated in the area that may increase the risk of flooding in the area or elsewhere.
Flood associated groundwater	Construction and Operation		✓	The construction and operation of the Proposed Scheme is not expected to elevate groundwater flooding risk as there is not an

Impacts	Phase	Scoped In	Scoped Out	Justification
				existing high risk of groundwater flooding within the area of the Proposed Scheme and no significant excavations are proposed.
Impact to groundwater associated users	Construction and Operation		✓	Groundwater abstractions are located approximately 1km southeast and 2km southeast of the Site Boundary and therefore are considered too distant from the Proposed Scheme to cause any impacts to groundwater associated users.
Groundwater flooding risk	Construction and Operation		✓	No adverse impacts related to an elevated groundwater flooding risk are expected during the construction and operation phases of the Proposed Scheme as there is not an existing high risk of groundwater flooding within the area of the Proposed Scheme and no significant excavations are proposed.
Springs	Construction and Operation		✓	No springs known to be situated near enough to the Proposed Scheme to be impacted.
Groundwater Dependent Terrestrial Ecosystems (GWDTEs)	Construction and Operation		✓	No GWDTEs situated near enough to the Site Boundary to be impacted by the Proposed Scheme.

10.8. PROPOSED ASSESSMENT METHODOLOGY

10.8.1. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with the LLFA, PLA (Port of London Authority) the Environment Agency and the MMO.

10.8.2. The assessment 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 (**Ref 10.40**). 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. The DMRB 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 10-6** 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 10-7** below.
- Assessment of the significance of the effect. The overall significance of the effect is based on the sensitivity of the receptor and the magnitude of the impact.

10.8.3. The overall significance of effects will consider both the sensitivity of the receptor and the magnitude of the impact, using the matrix shown in **Table 3-1** of **Chapter 3: EIA Methodology**.

10.8.4. Assessments will be undertaken for surface water features, groundwater, WFD, coastal processes and flood risk. A description of each of the assessments is provided after **Table 10-6** and **Table 10-7**.

Table 10-6: Water Environmental and Flood Risk Sensitivity Criteria

Important	Criteria	Examples
Very High	Nationally significant receptor of high sensitivity	• WFD classification shown in a RBMP and Q95 ≥ 1.0 m^3/s; or • 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.

Important	Criteria	Examples
		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 m^3/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 m^3/s.
		Unproductive strata.
		Water compatible development

Table 10-7: Water Environmental and Flood Risk Magnitude Criteria

Magnitude	Criteria	Examples
Major Adverse	Results in loss of receptor and/or quality and integrity of the receptor	• Loss or extensive change to a fishery; • Loss of regionally important public water supply; • Loss or extensive change to a designated nature conservation site; • Reduction in water body WFD classification; • Loss of, or extensive change to, an aquifer; • Loss of regionally important water supply;

Magnitude	Criteria	Examples
		• Potential high risk of pollution to groundwater from routine runoff; • Loss of, or extensive change to GWDTE or baseflow contribution to protected surface water bodies; • Reduction in water body WFD classification; • Loss or significant damage to major structures through subsidence or similar effects; and • Increase in peak flood level (> 100 mm).
Moderate Adverse	Affect integrity of receptor, or loss of part of receptor	• 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; • Degradation of regionally important public water supply or loss of significant commercial/ industrial/ agricultural supplies. Potential medium risk of pollution to groundwater from routine runoff; • Partial loss of the integrity of GWDTE; • Contribution to reduction in water body WFD classification; • Damage to major structures through subsidence or similar effects or loss of minor structures; and • Increase in peak flood level (> 50 mm).
Minor Adverse	Results in some measurable change in receptor's quality or vulnerability	• Minor effects on water supplies; • Potential low risk of pollution to groundwater from routine runoff; • Minor effects on an aquifer, GWDTEs, abstractions and structures; and • Increase in peak flood level (> 10 mm).
Negligible	Results in effect on receptor, but of insufficient magnitude to affect the use of integrity	• No risk identified to water supplies; • No measurable impact upon an aquifer and/or groundwater; and • Negligible change to peak flood level (≤ +/- 10 mm).

SURFACE WATER FEATURES

10.8.5. 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.

GROUNDWATER

10.8.6. The assessment of potential effects on groundwater will be undertaken qualitatively and through reviewing publicly available information along with obtaining information on licenced and private water abstractions within the Study Area. No site-specific ground investigation will be undertaken to inform the groundwater assessment.

WFD

10.8.7. A WFD Assessment for the Thames Middle Water body will be prepared to support the ES. In advance of the WFD Assessment a WFD Scoping Template has been completed , which is provided within **Appendix A** of this Report.

10.8.8. The WFD Screening Assessment will assess the effects of the Proposed Scheme on the Thames Middle Water body and identify any mitigation measures required.

10.8.9. The Thames Middle Water body is vast in comparison to the Site Boundary. Consequently, any potential effects are expected to be minimal compared to the surface area of the water body. This also applies to any impacts from the Proposed Scheme upon any undesignated water bodies and the resultant effects.

COASTAL PROCESSES

10.8.10. A detailed hydrodynamic site-specific modelling study will be undertaken in the MIKE by DHI software package to establish the extent and magnitude of any changes to the hydrodynamics of the River Thames during the construction and operation phase of the Proposed Scheme. Agreement on the modelling approach will be sought with the EA and the PLA.

10.8.11. 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.

10.8.12. Sediment plume modelling will be undertaken using the calibrated MIKE hydrodynamic model to consider the dispersion (extent and likely concentration) of any mobilised sediments caused as a result of the proposed dredging and construction 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. Again, using the outcomes from the modelling studies alongside expert judgement and local analogies, likely maintenance dredging requirements will be assessed within the main dredging area. The coastal processes assessment will build upon the findings of the EA's TE2100 (**Ref 10.41**) study 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.

FLOOD RISK

10.8.13. The assessment will consider the 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. An FRA will be prepared as an appendix to the ES. The assessment of potential effects because of the Proposed Scheme will consider both the construction and operation phases.

10.8.14. The FRA will be informed by the hydraulic modelling previously completed by the Environment Agency and will utilise the existing breach modelling. At this stage it is not considered necessary to undertake hydraulic modelling of the network of surface water features within and in the vicinity of the Site Boundary as the flows and levels are controlled by the two Environment Agency Pumping Stations.

10.9. ASSESSMENT LIMITATIONS AND ASSUMPTIONS

10.9.1. The following limitations and assumptions have been identified:

- The Proposed Scheme will not require a potable water supply for day-to-day operation, beyond welfare needs;
- It is not proposed to undertake hydraulic modelling 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;
- The scope of the water environment and flood risk assessments will be refined once further details of the Proposed Scheme design and construction methodology are available. Any changes to the scope of the assessments will be discussed and agreement sought with the LLFA, PLA and the Environment Agency as appropriate;
- 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; given that the design of the Proposed Scheme is not yet fixed, this will be confirmed during the PEIR; and

- It is not proposed to undertake a quantitative assessment of groundwater impacts. Until (and only if) this is determined to be necessary a qualitative assessment based on professional understanding of the geological and hydrogeological conditions will be undertaken.

10.10. REFERENCES

Ref 10.1: Department of Energy and Climate Change. (2011). 'Overarching National Policy Statement for Energy (EN-1)'. Available at: https://www.gov.uk/government/publications/national-policy-statements-for-energy-infrastructure

Ref 10.2: Department for Business, Energy & Industrial Strategy. (2021). 'Draft Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf

Ref 10.3: HM Government. (2021). **'**National Planning Policy Framework 2021'. Available at: https://www.gov.uk/guidance/national-planning-policy-framework

Ref 10.4: London Assembly. (2021). 'The London Plan 2021'. Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

Ref 10.5: Bexley Borough Council. (2012). 'London Borough of Bexley Core Strategy February 2012'. Available online: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Core-Strategy.pdf

Ref 10.6: Bexley Council. (2004). 'Unitary Development Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-12/Bexley-unitary-development-plan-written-statement-2004.pdf

Ref 10.7: London Borough of Bexley. 2021. 'Draft Local Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-10/Draft-local-plan-proposed-submission-document-reg-19-may-2021.pdf

Ref 10.8: Wood. (2019). 'Bexley Strategic Flood Risk Assessment Level-1'. Available at: www.bexley.gov.uk/sites/default/files/2021-05/Strategic-flood-risk-assessment-level-1-November-2020.pdf

Ref 10.9: Wood. (2020). 'Bexley Strategic Flood Risk Assessment Level-2'. Available at: www.bexley.gov.uk/sites/default/files/2021-05/Strategic-flood-risk-assessment-level-2-may-2021.pdf

Ref 10.10: HM Government. (2010). 'Flood and Water Management Act'. Available at: http://www.legislation.gov.uk/uksi/2017/407/contents/made

Ref 10.11: HM Government. (2018). 'The Environmental Permitting (England and Wales) (Amendment) Regulations 2018'. Available at: https://www.legislation.gov.uk/uksi/2018/110/contents/made

Ref 10.12: HM Government. (1991). 'Land Drainage Act'. Available at: http://www.legislation.gov.uk/ukpga/1991/59/contents

Ref 10.13: The Water Environment (Water Framework Directive) (England and Wales) Regulations. (2017). Available at: https://www.legislation.gov.uk/uksi/2017/407/contents/made

Ref 10.14: HM Government. (1991). 'The Water Resources Act'. Available at: http://www.legislation.gov.uk/ukpga/1991/57/contents

Ref 10.15: HM Government. (2015).'The Environmental Damage (Prevention and Remediation) (England) Regulation'. Available at: https://www.legislation.gov.uk/uksi/2015/810/contents

Ref 10.16: HM Government. (2009). 'The Groundwater (England and Wales) Regulations'. Available at: https://www.legislation.gov.uk/ukdsi/2009/9780111480816

Ref 10.17: HM Government. (2003). 'The Water Act'. Available at: https://www.legislation.gov.uk/ukpga/2003/37/contents

Ref 10.18: HM Government. (2014) 'The Water Act'. Available at: https://www.legislation.gov.uk/ukpga/2014/21

Ref 10.19: HM Government. (2016). 'The Groundwater (Water Framework Directive) (England) Direction 2016'. Available at: https://www.legislation.gov.uk/uksi/2015/1623/pdfs/uksiod_20151623_en.pdf

Ref 10.20: HM Government. (2021). 'Environment Act 2021'. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

Ref 10.21: Ministry of Housing, Communities and Local Government and Department for Levelling Up, Housing and Communities (2021) Planning Practice Guidance. Available at: https://www.gov.uk/government/collections/planning-practice-guidance

Ref 10.22: Environment Agency. (2023). 'Flood Maps for Planning'. Available at: https://flood-map-for-planning.service.gov.uk/

Ref 10.23: Environment Agency. (2023). 'Long Term Risk of Flooding'. Available at: https://flood-warning-information.service.gov.uk/long-term-flood-risk/map

Ref 10.24: Environment Agency. (2023). 'Risk of Flooding from Reservoirs – Maximum Flood Extent'. Available at: https://www.data.gov.uk/dataset/44b9df6e-c1d4-40e9-98eb-bb3698ecb076/risk-of-flooding-from-reservoirs-maximum-flood-extent-web-mapping-service

Ref 10.25: Environment Agency. (2023). 'Recording Flood Outlines'. Available at: https://data.gov.uk/dataset/16e32c53-35a6-4d54-a111-ca09031eaaaf/recorded-flood-outlines

Ref 10.26: Environment Agency. (2023). 'Catchment Data Explorer'. Available at: https://environment.data.gov.uk/catchment-planning

Ref 10.27: Environment Agency. (2022). 'Thames River Basin District River Basin Management Plan: Updated 2022'. Available at: https://www.gov.uk/guidance/thames-river-basin-district-river-basin-management-plan-updated-2022

Ref. 10.28: Ordinance Survey. (2023). Retrieved from: https://osmaps.ordnancesurvey.co.uk

Ref 10.29: Environment Agency. (2023). 'Survey Data Download'. Retrieved from: https://environment.data.gov.uk/DefraDataDownload/?Mode=survey

Ref 10.30: DEFRA/EA. (2023). 'MAGIC mapping'. Retrieved from: https://magic.defra.gov.uk/MagicMap.aspx

Ref 10.31: British Geological Survey. (2023). 'Geology of Britain Viewer'. Retrieved from: http://mapapps.bgs.ac.uk/geologyofbritain/home.html

Ref 10.32: British Geological Survey. (2021). 'GeoIndex'. Retrieved from: http://mapapps2.bgs.ac.uk/geoindex/home.html

Ref.10.33: Google. (2023). 'Google Maps'. Retrieved from: https://www.google.com/maps

Ref 10.34: National Library of Scotland. (2023). Retrieved from: https://maps.nls.uk/

Ref 10.35: Centre For Ecology and Hydrology. (2023). 'Flood Estimation Handbook Web Service'. Retrieved from: https://fehweb.ceh.ac.uk/GB/map

Ref 10.36: Enviro+Geo Insight. (2023). 'Groundsure Location Intelligence Report'. GS-9317318

Ref 10.37: Cory Riverside Energy Park. (2018). 'Environmental Statement Chapter 12: Hydrology, Flood Risk and Water Resources'. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010093/EN010093-000227-6.1%20ES%20Chapter%2012%20Hydrology%20Flood%20Risk%20and%20Water%20Resources.pdf

Ref 10.38: Environment Agency. (2022). 'Flood Risk Assessments: Climate Change Allowances'. Available at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Ref 10.39: CIRIA. (2015). 'The SuDS Manual (C753)'.

Ref 10.40: Design Manual for Roads and Bridges LA 113 Road Drainage and the Water Environment, Revision 1, March 2020

Ref 10.41: Environment Agency (2022). 'Thames Estuary 2100 (TE2100)' Available at: https://www.gov.uk/government/publications/thames-estuary-2100-te2100

11. CLIMATE RESILIENCE

11.1. INTRODUCTION

11.1.1. This chapter considers the impacts of climate change on the Proposed Scheme and assesses the vulnerability of the Proposed Scheme to climate change. It sets out the proposed methodology for the climate resilience assessment and identifies the climate variables that can be scoped out of further assessment. Where necessary further assessment will be presented in the ES.

11.1.2. The greenhouse gas assessment for the Proposed Scheme is considered in the **Chapter 12: Greenhouse Gases**, this identifies the increase or decrease in emissions as a result of the Proposed Scheme.

11.1.3. The climate resilience assessment will adhere to industry guidance, notably that from the Institute of Environmental Management and Assessment (IEMA) for climate resilience (**Ref 11.1**) and Design Manual for Roads and Bridges (DMRB) LA 114 – Climate (**Ref 11.2**).

11.2. POLICY, LEGISLATION, AND GUIDANCE

11.2.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is detailed in **Table 11-1**. The London Borough of Bexley Unitary Development Plan (UDP) 2004 has been excluded from **Table 11-1** due to a lack specific policies regarding climate resilience.

Table 11-1: Climate Resilience – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement for Energy (EN-1) 2011 (Ref 11.3)	Sets out the Government's policy for delivery of major energy infrastructure and will be the primary basis for decision making. EN-1 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, applicants must consider the impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of new energy infrastructure.
Draft Overarching National Policy Statement for	The Government has published a draft update to the Overarching National Policy Statement for Energy. Section 4.9 highlights that applicants and the Secretary of State

Policy / Legislation / Guidance	Description
Energy EN-1 2021 (Ref 11.4)	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 (such as the EA's Climate Change Allowances for Flood Risk Assessments) available at the time the ES was prepared to ensure they have identified appropriate mitigation or adaptation measures.
National Planning Policy Framework (NPPF) 2021 (Ref 11.5)	Presents the Government's planning policies for England and how these are to be applied. 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 (Ref 11.6)	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. Policy *GG6: Increasing Efficiency and Resilience* within the London Plan (2021) requires developments and infrastructure to be designed and adapted 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.
London Borough of Bexley Core Strategy 2012 (Ref 11.7)	The Core Strategy sets out the Council's long term vision for development in the borough. It aims to support a strong, sustainable and cohesive community. All developments should contribute to the delivery of sustainable development by planning for, adapting to, and mitigating the impacts of climate change from rising temperatures from the urban heat island effect and the management of flood risk and surface water under Policy CS08.

Policy / Legislation / Guidance	Description
London Borough of Bexley Draft Local Plan 2021 (Ref 11.8)	The new Local Plan is awaiting adoption and will then replace the Bexley Core Strategy and Saved UDP policies 2012. The Council will support new developments and infrastructure in tackling the effects of climate change under policy *SP14: Mitigating and Adapting to Climate Change*. This includes, for example, the contribution green infrastructure can make to managing flood risk and surface water, and to the mitigation of the urban heat island effect.
Climate Change Adaptation: Policy Information 2021 (Ref 11.9)	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, National Adaptation Programme, Adaptation Reporting Power, UK Climate Projections 2018 and the UK Climate Resilience Programme.
Bexley's Environmental Sustainability Strategy 2011 (Ref 11.10)	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 2022 (Ref 11.11)	*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. *Commitment 4: Enabling a greener economy* of the Action Plan aims to ensure that jobs and businesses that increase sustainability and reduce emissions are known as the green economy.
London Environment Strategy 2018 (Ref 11.12)	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.
Legislation	

Policy / Legislation / Guidance	Description
The Climate Change Act 2008, as amended 2019 (Ref 11.13)	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 2016 (Ref 11.14)	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 (Ref 11.1)	This guide sets out how to consider climate change resilience and adaptation in EIA reporting.
Design Manual for Roads and Bridges LA 114 – Climate 2021 (Ref 11.2)	This document establishes the requirements for assessing and reporting the effects of climate on highways. While this project is not a highways Proposed Development, the significance criteria assessment in Section 3 of LA114 provides a useful methodology which has been adopted within this assessment.

11.3. BASELINE CONDITIONS AND FUTURE BASELINE

Current Baseline

11.3.1. The current baseline for the climate resilience assessment will be based on historic climate data obtained from the Met Office records (**Ref 11.15**) for the closest meteorological station to the Proposed Scheme (Greenwich Park, approximately 11 km west of the Proposed Scheme) for the period 1981-2010 and Met Office Regional Climate Profiles. The Site is located in the Met Office Regional climate profile of Southern England (**Ref 11.16**).

11.3.2. The information gathered and presented within the ES for Riverside 2 will inform the baseline relevant to climate resilience, where relevant.

Precipitation – Rainfall

11.3.3. Much of Southern England is relatively distant from the route of many Atlantic depressions. The Proposed Scheme is in the north-east of the region where there is increasing shelter from rain-bearing southwest winds, compared to areas further south. The wettest areas of the Southern England climate profile region are the South Downs and the higher parts of Dorset, with an average of over 950mm per year. In contrast, the Thames Valley, London (the location of the Proposed Scheme) and the north Kent coast normally receive less than 650mm of rain per year. These values can be compared with annual totals of around 500mm in the driest parts of eastern England and over 4,000mm in the western Scottish Highlands.

11.3.4. Average seasonal rainfall at Greenwich Park, for the Southern England climate profile, and for the UK for the period 1981–2010 are presented in **Table 11-2**. It shows that the region and weather station are significantly drier than the UK average for summer and winter and that rainfall, in the area of the weather station, is also lower than the average of the region.

Table 11-2: Long Term Average Seasonal Rainfall (mm) (1981–2010) for the Southern England and Greenwich Park, in comparison to the Region and Rest of the UK

Season	Long Term Average Season Rainfall (1981-2010) (mm)		
	Greenwich Park	Southern England	UK
Summer (June, July, August)	136	176	238
Winter (January, February, December)	126	213	328

11.3.5. A recent, notable extreme rainfall event for the region was flash flooding in October 2022, where some areas saw a months' worth of rain in a day. Multiple roads were

closed, including the M25, with tube and railway services also disrupted (**Ref 11.17**). Contrastingly, Southern England is prone to drought. The Kent and South London Environment Agency Area was declared as in-drought in August 2022.

Precipitation – Snow and Ice

11.3.6. Snowfall is closely linked with temperature, with falls rarely occurring if the temperature is higher than 4°C. On average, the number of days with snow falling in the region is about 12-15 per year over the lower lying areas. The monthly averages of days with sleet/snow falling at Heathrow is approximately 12.5 days, with snow lying around 4.5 days per year (compared with parts of the Scottish Highlands where on average there are 60 days with snow lying); Heathrow is the closest data point for this climate variable (**Ref 11.15**). 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 (**Ref 11.18**). This type of disruption could affect working conditions and the ability of staff to get to and from the Proposed Scheme.

Temperature

11.3.7. **Table 11-3** shows the long term average seasonal mean temperature for Southern England and Greenwich Park between 1981 and 2010. It shows that the Proposed Scheme area is warmer than the region and significantly warmer than the UK average.

Table 11-3: Long term Average Mean Seasonal Temperature for the Southern England and Greenwich Park, in Comparison to the Rest of the UK

Season	Long Term Average Seasonal Temperature (1981-2010s) (°C)		
	Greenwich Park	Southern England	UK
Summer (June, July, August)	17.8	16	14.4
Winter (January, February, December)	5.7	4.5	3.7

11.3.8. 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 (**Ref 11.19**). Contrastingly, December 2022 saw a prolonged spell of low temperatures, with snow and icy conditions disrupting road and rail travel in London (**Ref 11.20**).

Wind

11.3.9. Southern England is one of the more sheltered parts of the UK, the windiest areas being in western and northern Britain, closer to the Atlantic. The strongest winds are

associated with the passage of deep areas of low pressure close to or across the UK. The frequency and strength of these depressions is greatest in the winter half of the year, especially from December to February; the period when mean speeds and gusts (short duration peak values) are strongest. The most recent notable gale affecting the region was in February 2022 when Storm Eunice led to wind speeds reaching over 50mph in east London (**Ref 11.21**), the roof of the nearby O2 stadium ripped off (**Ref 11.22**) and a woman died in north London when a tree fell on her car (**Ref 11.23**).

Humidity

11.3.10. 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%) (**Ref 11.24**). 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 (**Ref 11.25**).

Sea Level Rise

11.3.11. The Proposed Scheme is located on the River Thames and within the tidal and fluvial flood zones (**Ref 11.26**) which may experience sea level rise. It is consequently within the Thamesmead Policy Unit, identified in the 2100 Plan Action Zone 4, an area that is low lying, with ground levels typically 2m to 3m below high water on spring tides (**Ref 11.26**). Flood depths in a surge tide event overtopping or breaching the defences could exceed 5m (though this would be an extreme event) (**Ref 11.26**). The area is therefore very vulnerable to tidal flood risk.

11.3.12. The above risks are managed through fluvial flood management that is provided by a system of open channels with pumped and gravity outfalls into the Thames and the tidal flood defences downriver. Therefore, 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).

Future Baseline

11.3.13. The UKCP18 (**Ref 11.27**) provide data on projected change in climate variables for the UK. The UKCP18 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 by Nigel Arnell *et al.* (**Ref 11.28**) as part of the UK Climate Resilience Programme has been used to inform the assessment approach. The CRI utilises the UKCP18 projections and allows for a range of climate related indicators (including, but not limited to, Met Office heatwaves and heat stress) to be assessed.

11.3.14. 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).

11.3.15. 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.

11.3.16. 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 key components (refer to the scope of assessment below).

11.3.17. As the future baseline assessment is informed by the closest meteorological station and regional profiles, the assessment area includes the existing operation of Riverside 1, and Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken) which will be operational under the future baseline.

Precipitation – Rainfall

11.3.18. Climate change is projected to lead to wetter winters and drier summers although natural variation, including extreme events such as storms, heavy downpours and heatwaves, will continue to punctuate these trends. The projected changes to average summer and winter rainfall for the 2030s, 2050s and 2080s are summarised in **Table 11-4**.

Table 11-4: Projected Change in Average Summer and Winter Precipitation (%) 50th percentile (10th percentile to 90th percentile) for the 2030s, 2050s and 2080s, RCP8.5

Season	2030s	2050s	2080s
Summer (June, July, August)	-13 (-27.8 to +5.5)	-21.2 (-41.8 to +0.5)	-32.7 (-55.5 to -4.4)
Winter (January, February, December)	+6.5 (-2 to +15.3)	+10.6 (-0.9 to +23.6)	+17.8 (+2.1 to +35.6)
Summer (June, July, August)	-13 (-27.8 to +5.5)	-21.2 (-41.8 to +0.5)	-32.7 (-55.5 to -4.4)

Precipitation – Snow and Ice

11.3.19. With regards to future changes, rising winter temperatures are likely to reduce the amount of precipitation that falls as snow in winter. Snowfall data is unavailable for the probabilistic projections in which the Proposed Scheme is located at the 25km grid resolution, however both the regional (12km grid resolution) and the local (2.2km grid resolution) show a decrease in both falling and lying snow across the UK for the period of 2061-2080 relative to the 1981-2010 baseline (**Ref 11.29**).

Temperature

11.3.20. In general, UKCP18 projects that climate change will lead to hotter summers and warmer winters. **Table 11-5** summarises the UKCP18 projections for changes in

mean temperature for the Proposed Scheme location in the 2030s, 2050s and 2080s under RCP 8.5. For example, a +1.5˚C increase in summer temperatures in the 2030s at Greenwich Weather Station would equate to a mean Summer temperature increase from 17.8°C to 19.3˚C. In the 2080s, this would equate to a mean Summer temperature increase from 17.8˚C to 22.9°C.

Table 11-5: Projected Change in Mean Summer and Winter Temperature (°C) 50th percentile (10th percentile to 90th percentile) for the 2030s, 2050s and 2080s RCP8.5

Season	2030s	2050s	2080s
Summer (June, July, August)	+1.5 (+0.7 to +2.4)	+2.7 (+1.3 to +4.3)	+5.1 (+2.7 to +7.8)
Winter (January, February, December)	+1 (+0.1 to +1.9)	+1.7 (+0.7 to +2.9)	+3 (+1.3 to +4.9)

Wind

11.3.21. 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.

11.3.22. 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%.

Humidity

11.3.23. Projections for humidity anticipate an average decrease of approximately 2.2% in the 2030s (-3.3% to -1.8%), and a decrease of 3.6% in the 2050s (-4.9% to -3%).

Sea Level Rise

11.3.24. 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 as a result of the impacts of climate change which 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 11.3** have an upper end sea level allowance for the Southeast and River Thames which ranges from 6.9mm to 18.2mm from year 2000 to 2125, with a cumulative rise of 1.6m (**Ref 11.30**). **Table 11-6** the projected sea-level rise for the 2030s, 2050s and 2080s, using UKCP18 marine projections.

Table 11-6: Projected Change in Sea-level (m) for the 2030s, 2050s and 2080s for RCP8.5 (50th percentile and 90th percentile)

2030s	2050s	2080s
+0.15 (+0.19)	+0.29 (+0.37)	+0.57 (+0.74)

11.4. STUDY AREA

11.4.1. 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 Boundary.

11.5. SENSITIVE RECEPTORS / RESOURCES

11.5.1. The following sensitive receptors have been identified for the construction phase of the Proposed Scheme:

- Construction site (including access roads and site boundary fencing);
- Construction staff;
- Construction materials; and
- Plant and equipment for the Carbon Capture and Storage Project and the Hydrogen Project (including the ancillary infrastructure and equipment, detailed in **Chapter 2: Site and Proposed Scheme Description**).

11.5.2. The following sensitive receptors have been identified for the operation phase of the Proposed Scheme:

- The Carbon Capture and Storage Project and the Hydrogen Project (including the ancillary infrastructure and equipment, detailed in **Chapter 2: Site and Proposed Scheme Description**);
- Riverside Campus (Riverside 1 and Riverside 2, including Middleton Jetty);
- Proposed Jetty and export structures; and
- Operational staff.

11.5.3. The sensitive receptors are vulnerable to changes in climate variables as explained in **Section 11.7, Table 11-7** and **Table 11-8**.

11.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION PHASE

11.6.1. Relevant design, mitigation and enhancement measures will be identified in the ES, these may include:

- Ensuring that construction drainage (i.e. for surface water runoff) is in place and has sufficient capacity to cope with heavy rainfall events. Ensuring that silt traps are in use and regularly emptied to ensure flows of water, to avoid flooding.

- Sealing spoil heaps and stockpiles shortly after excavation and formation to preserve their profile and integrity of stability.
- Covering spoil and material heaps in advance of predicted storms that are likely to include periods of high rainfall and/or high winds.
- Minimising the material stockpiled by either using it as soon as possible or removing from site if reuse or redeployment is not an option. Where material is stockpiled on site, this would be regularly inspected in advance, during, and following, extreme weather events (e.g., storms and heatwaves).
- Provide adequate rest, shade and Personal Protective Equipment (PPE), 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.
- Adjusting 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 additional contingency into the programme.
- Switching-off machinery when not in use to avoid the risk of overheating.
- 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).
- Ensuring access roads used during construction are monitored, especially during periods of heavy rainfall and appropriate traffic management put in place to avoid areas of potential flooding. Local advice from the council or traffic authority regarding traffic management measures that may be required during times of extreme weather would be implemented.
- Ensuring the management protocols of the Contractor(s), including overall management and any civil works contractors employed, are proactive taking action following the forecasting of extreme weather events. Flexible management plans held on site that are adaptable during the construction phase. Management plans to be included in, and networked into, the existing emergency response plans at the county level and generally aligned with the Riverside Campus operational requirements.

OPERATION PHASE

11.6.2. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- 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 drainage components have been designed with a climate change allowance in line with Environment Agency flood risk assessment allowances (**Ref 11.30**).
- Ensure structures have been designed to take into account an increase in extreme wind and storm events; this should include ensuring emergency access routes to critical parts of the infrastructure even in the event of flooding.
- Regular inspection of drainage infrastructure, materials and structures to identify any deterioration. Additional inspection of earthworks and structures following extreme weather events (e.g. floods, heatwaves, drought, storm). Bring forward repair/replacement if necessary.
- Incorporating planting resilient to the projected changes in climate in the landscape designs. Optimal frequency of vegetation management (e.g. inspection, planting).
- Provision of a battery energy storage system and/or emergency standby generators; and appropriate hazard and warning signage within and surrounding the Proposed Scheme.

11.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

VULNERABILITY

11.7.1. The scope of the vulnerability assessment, undertaken as part of EIA Scoping, includes the construction phase and design life of the Proposed Scheme (operation phase).

11.7.2. The IEMA guidance (**Ref 11.1**) outlines that Scoping should identify the key climatic variables relevant to the Proposed Scheme and the potential effects; however, it is not prescriptive on how this is undertaken. LA 114 (**Ref 11.2**) establishes the requirements for assessing and reporting the effects of climate on transport infrastructure. While the Proposed Scheme is not a transport scheme, Section 3 of LA 114 provides a useful methodology that will be adopted within this assessment. LA 114 outlines that EIA Scoping should focus on the identification of any likely significant climate changes and likely exposure of the Proposed Scheme to these changes, in order to identify vulnerable elements that will require further assessment in the ES.

11.7.3. The vulnerability of key components of the Proposed Scheme to climate variables is determined from the combination of sensitivity and exposure ratings as follows:

- The typical sensitivity of receptors to climate variables – considers the impact of the climate on the specific receptors, taking into account any preliminary design measures (where available). The assessment is based on literature review and professional judgement and sensitivity is rated as high, medium or low; and
- The exposure of receptors to projected change in climate variables – based on the current climate and the future projections identified in the baseline information presented above and rated as high, medium or low.

11.7.4. The vulnerability assessment identifies the climate variables for the construction and operation phases to consider in further detail at the ES. Vulnerability determines the scope of further assessment, whereby:

- Climate variables to which the Proposed Scheme is likely to have a low vulnerability are scoped out of further assessment; and
- Climate variables in the construction and operation phase to which the Proposed Scheme is likely to have a medium or high vulnerability are taken forward for further assessment at the next stage.

11.7.5. **Table 11-7** displays the vulnerability matrix.

Table 11-7: Vulnerability Matrix

Sensitivity	Exposure		
	Low	Medium	High
Low	Low Vulnerability	Low Vulnerability	Low Vulnerability
Medium	Low Vulnerability	Medium Vulnerability	Medium Vulnerability
High	Low Vulnerability	Medium Vulnerability	High Vulnerability

Sensitivity

11.7.6. The baseline conditions for sensitivity provide an overview of the climate variables that have the potential to impact the Proposed Scheme. A description of how these climate variables could potentially impact the receptors is outlined here.

Construction

11.7.7. The construction site would be sensitive to extreme weather such as heavy rainfall events and heatwaves. Heavy precipitation may lead to flash floods and waterlogging on the construction site, comprising any materials contained on site. Heatwave conditions may pose health risks to staff and could disrupt the operation of plant and machinery. Structures would be sensitive to storms and heavy winds, also posing risks to staff. Such weather events may lead to delays in the construction process.

Operational

11.7.8. The sensitive receptors (outlined in **Section 11.5**) are vulnerable to changes in climate variables as explained below.

Precipitation

11.7.9. The Carbon Capture and Storage Project and the Hydrogen Project are sensitive to high and low rainfall. For example, drying out and cracking of materials may affect structural stability. Prolonged periods without precipitation can lead to cracking of surfaces, including landside access roads and potentially the road surface on the Proposed Jetty roads, and more increased rate of material deterioration. Prolonged

dry spells (particularly during the summer months) can also lead to low river flows, affecting the water that is available for cooling.

11.7.10. The Proposed Scheme lies within Flood Zone 3 therefore, flooding (fluvial and pluvial within the Site Boundary) may directly cause damage to the Proposed Scheme, potentially reducing earthwork stability and hastening the deterioration of materials. Pluvial and fluvial flooding or high ground water levels may cause pollutants in the soil to be mobilised, which can potentially affect building materials and consequently structure. Flood risk may be substantially influenced by the design of the Proposed Scheme as well as its siting. As identified in **Section 11.3** the Site currently benefits from flood defences with a standard protection of 1 in 1,000 years.

11.7.11. Snow and ice can cause damage to above-ground infrastructure, including roofs and damage to overhead cables. Site drainage may become overwhelmed due to heavy precipitation.

Temperature

11.7.12. Both the Carbon Capture and Storage Project and the Hydrogen Project are sensitive to high and low temperatures through:

- exacerbating existing faults;
- overheating of infrastructure, leading to greater demand for cooling;
- overheating of electronic equipment;
- increased pressure on compression, dehydration, and oxygen removal;
- for the Carbon Capture and Storage Project, safety risks to solvent and for the storage of hydrogen within the Hydrogen Project;
- deterioration of material structure and fabric;
- damage to paved surfaces, including potential melting and deformation;
- increased temperature of cooling water and of river flows that are used for cooling, thereby reducing efficiency of this process; and
- security infrastructure and lighting may fail in heatwave conditions.

Wind and Storms

11.7.13. High wind speeds and gusts can have impacts on the Carbon Capture and Storage Project and the Hydrogen Project. Whilst the short term consequences of wind-related disruption are large, repairs can usually be carried out quickly. High winds and storms can affect the stability of above-ground infrastructure and hasten material degradation. High winds can also cause wind-driven rain infiltration into building materials and surfaces, which can increase maintenance costs and operational disruption. Lightning strike can cause fire as well as power surges and shock waves which can destabilise energy systems, as well as cause damage to electronic and Information and Communications Technological equipment. The Proposed Jetty may be unsafe to operate in high wind speeds.

Relative Humidity

11.7.14. Humidity affects both the performance of the Carbon Capture and Storage Project and the Hydrogen Project as well as the comfort of staff. An increase in humidity can increase condensation, mould growth, mildew, staining and the corrosion and decay of metal surfaces, as well as poor performance insulation.

Sea Level

11.7.15. The Carbon Capture and Storage Project and the Hydrogen Project will be sensitive to changes in sea level. Power outages, threats to business continuity and potential damage to the Proposed Jetty are the main risks associated with sea level rise.

11.7.16. Based on this information, literature review and professional opinion, **Table 11-8** and **Table 11-10** outline the climate sensitivity of the Proposed Scheme components for the construction and operation phases.

Construction Phase

11.7.17. As the construction period (estimated to be a 60-month programme) is considered to be a relatively short period in relation to the overall timescales considered for assessment under climate resilience, it is considered that only extreme climate events such as heavy rainfall, storms and heatwaves could pose potentially significant effects to the Proposed Scheme. Further details on the construction programme are provided in **Chapter 2: Site and Proposed Scheme Description**.

11.7.18. The potentially significant effects associated with the operation phase are shown in **Table 11-8**.

Table 11-8: Potentially Significant Effects – Construction Phase

Climate Hazard	Associated Hazard	Receptor(s) Affected	Potential Impacts
Precipitation	Extreme precipitation events	Construction site, construction staff, construction materials, and plant and equipment	• Increased runoff from materials piles; • Excessive moisture in materials; • Destabilisation of material, including topsoil and spoil heaps; • Increased slope instability; • Increase in dust; • Flooding of the Site; • Overwhelming of drains; • Waterlogging of site excavations; and • Increased surface runoff leading to surface water flooding and siltation.
Temperature	Extreme temperature events	Construction site, construction staff, construction materials, and plant and equipment	• Deformation and melting of materials; • Shorter drying times in summer; • Enhanced reactions when cement stabilising and drying of concrete; • Drying out of materials; • Risk of fire; • Overheating of machinery; • Failure or disruption of plant and equipment; and

Climate Hazard	Associated Hazard	Receptor(s) Affected	Potential Impacts
			• Unsafe working conditions (heatstroke, UV levels).
Wind	Gales and extreme wind events	Construction site, construction staff, and construction materials	• Increase in dust; • Unsafe working conditions (working at height); and • Risk to cranes and working at height.
	Storms (hail, lightning)		

11.7.19. The sensitivity and exposure analysis are combined to provide an overall assessment of ‘vulnerability’ of the Proposed Scheme. In this context vulnerability is the degree to which the Proposed Scheme is susceptible to, and unable to cope with, the adverse effects of climate change. High and medium vulnerabilities will be assessed in more detail at the next stage of the assessment. **Table 11-9** presents the assessment of vulnerability for the construction components of the Proposed Scheme on the assumption that all construction measures provided in **Section 11.6** will be included.

11.7.20. Following this assessment, **Table 11-12** identifies the climate variables that have been scoped into and out of further assessment, combined with the findings from the operation phase vulnerability assessment.

Table 11-9: Vulnerability Assessment – Construction Phase

Receptor	Variable		Sensitivity	Exposure	Vulnerability
Construction Site and Staff	Precipitation	Change in annual average	Low	Low	Low
		Drought	Low	Low	Low
		Extreme precipitation events (flooding)	Low	Medium	Low
	Temperature	Change in annual average	Low	Low	Low
		Extreme temperature events	Low	Medium	Low
	Wind	Gales and high winds	Low	Medium	Low
		Storms	Low	Medium	Low
Construction Materials	Precipitation	Change in annual average	Low	Low	Low
		Drought	Low	Low	Low
		Extreme precipitation events (flooding)	Low	Medium	Low
	Temperature	Change in annual average	Low	Low	Low
		Extreme temperature events	Low	Medium	Low
	Wind	Gales and high winds	Low	Medium	Low
		Storms	Low	Medium	Low

Receptor	Variable		Sensitivity	Exposure	Vulnerability
Plant and Equipment	Precipitation	Change in annual average	Low	Low	Low
		Drought	Low	Medium	Low
		Extreme precipitation events (flooding)	Low	Medium	Low
	Temperature	Change in annual average	Low	Low	Low
		Extreme temperature events	Low	Medium	Low
	Wind	Gales and high winds	Low	Medium	Low
		Storms	Low	Medium	Low

OPERATION PHASE

11.7.21. The operation phase is anticipated to operate for a minimum of 25 years with certain components having a design life of 50 years (concrete, structural steelwork, and cathodic protection etc) and therefore the components outlined in **Section 11.5** are more susceptible to changing weather conditions.

11.7.22. This assessment uses information provided in the baseline and **Section 11.8** to assess the vulnerability of the operational components of the Proposed Scheme.

11.7.23. The potential significant effects associated with the operation phase are shown in **Table 11-10**.

11.7.24. **Table 11-11** shows the vulnerability assessment for the operation phase. This assessment evaluates the associated hazards outlined in **Table 11-10** and the sensitivity, exposure, and vulnerability is assessed based on the variables outlined earlier in this section.

Table 11-10: Potential Significant Effects – Operation Phase

Climate Hazard	Associated Hazard	Receptor(s) Affected	Potential Impacts
Precipitation **Sea level rise**	Extreme precipitation events Changes in annual average	• Carbon Capture and Storage Project and the Hydrogen Project; • Proposed Jetty and export structures; • Ancillary infrastructure; • Ancillary equipment; and • Operational Staff.	• Flooding of all assets resulting in loss or disruption of function and associated risks; • Deterioration of material structure and fabric; • Drying out and cracking of materials; • Drainage infrastructure overwhelmed leading to surface water flooding; • Drainage infrastructure blocked during periods of drought; • Mobilisation of pollutants, affecting building materials; • Damage to above-ground infrastructure from snow and ice; and • Injuries to staff
Temperature	Extreme temperature events Changes in annual average		• Reduction in the ability of the ground to conduct heat away from underground cables during high temperatures; • Overheating of any existing power generation units and stack associated with safety risks; • Changes in water temperature and availability of water for cooling may affect operation; • Greater demand for cooling; • Risk of fire and associated safety risks; • Faster rate of deterioration of materials from increase in UV radiation e.g. fading and brittleness; • Failure of security infrastructure and lighting due to overheating;

Climate Hazard	Associated Hazard	Receptor(s) Affected	Potential Impacts
			• Melting or deterioration of road surfaces; • Loss of vegetation cover due to scorching leading to destabilisation and longer growing season; and • Injuries to workforce.
Wind	Gales and extreme wind events		• Increase in wind loading on the stacks; • Potential for safety risks should structure become weakened; • Damage from high winds and rain infiltration into surfaces and materials; • Increased maintenance requirements; • Destabilisation of structures due to lighting strike; • Power loss; • Soil erosion leading to destabilisation; and • Windborne dust and debris clogging drainage channels and requiring clearing.
Relative Humidity	Changes in annual average Evaporation	• Ancillary infrastructure; • Ancillary equipment; and • Operational Staff.	• Increase condensation, mould growth, mildew, staining and the corrosion and decay of metal surfaces; and • Poor performance of insulation.

Climate Hazard	Associated Hazard	Receptor(s) Affected	Potential Impacts
Sea Level Change	Sea level rise Storm surge	• Carbon Capture and Storage Project and the Hydrogen Project; • Proposed Jetty and export structures; • Ancillary infrastructure; • Ancillary equipment; and • Operational Staff.	• Damage to infrastructure; • Reducing earthwork stability and hastening the deterioration of materials; and • Power outages and threats to business continuity.

Table 11-11: Vulnerability Assessment – Operation Phase

Receptor	Variable		Sensitivity	Exposure	Vulnerability
Carbon Capture and Storage Project and Hydrogen Project	Precipitation	Change in annual average	Low	Medium	Low
		Drought	Low	Low	Low
		Extreme precipitation events (flooding)	Moderate	High	Medium

Receptor	Variable		Sensitivity	Exposure	Vulnerability
	Temperature	Change in annual average	Low	Medium	Low
		Extreme temperature events	Moderate	Medium	Medium
	Wind	Gales and high winds	Moderate	Medium	Medium
		Storms	Moderate	Medium	Medium
	Relative Humidity	Change in annual average and evaporation	Low	Low	Low
	Sea level	Sea level rise	Moderate	Medium	Moderate
		Storm surge and storm tide	Moderate	Medium	Moderate
Proposed Jetty	Precipitation	Change in annual average	Low	Medium	Low
		Drought	Low	Medium	Low
		Extreme precipitation events (flooding)	Moderate	High	Medium
	Temperature	Change in annual average	Low	Medium	Low

Receptor	Variable		Sensitivity	Exposure	Vulnerability
		Extreme temperature events	Moderate	Medium	Medium
	Wind	Gales and high winds	High	Medium	Medium
		Storms	High	Medium	Medium
	Relative Humidity	Change in annual average and evaporation	Low	Low	Low
	Sea level	Sea level rise	High	Medium	Medium
		Storm surge and storm tide	High	Medium	Medium
Ancillary Infrastructure	Precipitation	Change in annual average	Moderate	Medium	Medium
		Drought	Moderate	Medium	Medium
		Extreme precipitation events (flooding)	High	High	High
	Temperature	Change in annual average	Moderate	Medium	Medium
		Extreme temperature events	High	High	High

Receptor	Variable		Sensitivity	Exposure	Vulnerability
	Wind	Gales and high winds	Moderate	Medium	Medium
		Storms	Moderate	Medium	Medium
	Relative Humidity	Change in annual average and evaporation	Low	Low	Low
	Sea level	Sea level rise	High	Medium	Medium
		Storm surge and storm tide	Moderate	Medium	Medium
Ancillary Equipment	Precipitation	Change in annual average	Low	Medium	Low
		Drought	Low	Low	Low
		Extreme precipitation events (flooding)	Moderate	High	Medium
	Temperature	Change in annual average	Low	Medium	Low
		Extreme temperature events	Moderate	Medium	Medium
	Wind	Gales and high winds	Moderate	Medium	Medium

Receptor	Variable		Sensitivity	Exposure	Vulnerability
		Storms	Moderate	Medium	Medium
	Relative Humidity	Change in annual average and evaporation	Low	Low	Low
	Sea level	Sea level rise	Moderate	Medium	Medium
		Storm surge and storm tide	Moderate	Medium	Medium
Operational Staff	Precipitation	Change in annual average	Low	Low	Low
		Drought	Low	Low	Low
		Extreme precipitation events (flooding)	Moderate	High	Medium
	Temperature	Change in annual average	Low	Medium	Low
		Extreme temperature events	Moderate	Medium	Medium
	Wind	Gales and high winds	Moderate	Medium	Medium
		Storms	Moderate	Medium	Medium

Receptor	Variable		Sensitivity	Exposure	Vulnerability
	Relative Humidity	Change in annual average and evaporation	Low	Low	Low
	Sea level	Sea level rise	Moderate	Medium	Medium
		Storm surge and storm tide	Moderate	Medium	Medium

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

11.7.25. Based on the assessment undertaken in **Table 11-9** and **Table 11-11,** any receptor that was rated as having a medium or high vulnerability will be scoped in for further assessment. The impacts scoped in or out for the climate resilience assessment are provided in **Table 11-12**.

Table 11-12: Climate Resilience - Scoped In or Out of Further Assessment

Receptor	Phase	Scoped In	Scoped Out	Justification
Construction site, Construction staff, Construction materials and Plant & Equipment: All Climate Variables	Construction		✓	Given the short length of time of the construction period and the measures identified in **Section 11.6**, effects associated with climate change during the construction phase have been scoped out of further assessment. Low vulnerability as shown in **Table 11-9**.
Operation of Carbon Capture and Storage Project and Hydrogen Project Extreme precipitation events (flooding) Extreme temperature events Gales and high winds Storms **Sea level rise**	Operation	✓		Determined as low-medium vulnerability in **Table 11-11**. Operation of the Carbon Capture and Storage Project and the Hydrogen Project is likely to have a medium level of sensitivity and have a medium-high level of exposure to the climate variables outlined within the impacts column.
Operation of Carbon Capture and Storage Project and the Hydrogen Project All other climate impacts	Operation		✓	Determined as low vulnerability in **Table 11-11**. These variables include changes in annual averages and sea level in which the operation of the Carbon Capture Plant is likely to be less sensitive to.
Proposed Jetty	Operation	✓		Determined as medium vulnerability in **Table 11-11**.

Receptor	Phase	Scoped In	Scoped Out	Justification
Extreme precipitation events (flooding) Extreme temperature events Gales and high winds Storms Sea level rise Storm surge and storm tide				Jetty infrastructure on the River Thames is susceptible to the climate variables outlined in the impacts column.
Proposed Jetty All other climate impacts	Operation		✓	Determined as low vulnerability in **Table 11-11**. The Proposed Jetty is likely to have a low sensitivity and medium level of exposure to annual average changes and drought.
Ancillary Infrastructure All climate impacts excluding relative humidity	Operation	✓		Determined as medium-high vulnerability in **Table 11-11**. Sites infrastructure is likely to have a medium-high sensitivity and exposure to all climate variables excluding relative humidity.
Ancillary Infrastructure Relative humidity (change in annual average and/or evaporation)	Operation		✓	Determined as low vulnerability in **Table 11-11**. Sites infrastructure is likely to be of low sensitivity and a low level of exposure to changes in relative humidity.

Receptor	Phase	Scoped In	Scoped Out	Justification
Ancillary Equipment Extreme precipitation events (flooding) Extreme temperature events Gales and high winds Storms Sea level rise Storm surge and storm tide	Operation	✓		Determined as medium vulnerability in **Table 11-11**. Ancillary equipment is likely to be affected extreme weather events, storms and sea level variables.
Ancillary Equipment All other climate variables	Operation		✓	Determined as low vulnerability in **Table 11-11**. Ancillary equipment is likely to be of low sensitivity to changes in annual averages and drought.
End Users Extreme precipitation events (flooding). Extreme temperature events Gales and high winds Storms Sea level rise Storm surge and storm tide	Operation	✓		Determined as medium vulnerability in **Table 11-11**. End users are likely to have a moderate sensitivity and medium-high exposure to the climate variables outlined in the impacts column.

Receptor	Phase	Scoped In	Scoped Out	Justification
End Users All Other Climate Variables	Operation		✓	Determined as low vulnerability in **Table 11-11**. End users are likely to be of low sensitivity to changes in annual averages and drought.

11.8. PROPOSED ASSESSMENT METHODOLOGY

11.8.1. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with LBB. The assessment of impacts will be undertaken using an approach based on the IEMA guidance (**Ref 11.1**), DMRB LA 114 (**Ref 11.2**) and professional judgement.

11.8.2. In the ES, the significance of effects of changes in (scoped in) climate variables on receptors will be identified for the operation phase. The significance of effects will be determined by considering the consequence and the likelihood of potential impacts associated with changes in climate variables on Proposed Scheme components occurring. Likelihood and consequence will be qualitatively assessed using the descriptions in **Table 11-13** and **Table 11-14**. These descriptions have been developed using professional judgement, informed by relevant guidance. It should be noted that the LA 114 guidance has been developed for transport infrastructure specifically, and therefore, the description of the measure of consequence will have regard to the wider Proposed Scheme.

11.8.3. The assessment of likelihood and consequence (and therefore significance) will take embedded mitigation into account as an assumed part of the design. Embedded mitigation will be identified through engagement with the design team.

Table 11-13: Consequences Definitions

Measure of consequence	Description
Negligible	No infrastructure damage, minimal adverse effects on health, safety and the environment or financial loss. Little change to service and disruption lasting less than one day.
Minor Adverse	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 effects.
Moderate Adverse	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 effects on health and/or the environment.
Large Adverse	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. Significant effect on the environment, requiring remediation.

Measure of consequence	Description
Very Large Adverse	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 significant loss to the environment requiring remediation and restoration.

Table 11-14: 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 15 years.
Low	The event occurs occasionally during the lifetime of the Proposed Scheme e.g. once in 60 years.
Very Low	The event may occur once during the lifetime of the Proposed Scheme.

SIGNIFICANCE OF EFFECT CRITERIA

11.8.4. The likelihood and consequence are combined to assess the significance of effects on receptors, as shown in **Table 11-15**. The assessment is qualitative and based on professional judgment, engagement with the design team and a review of relevant literature.

Table 11-15: Significance Rating Matrix

Likelihood	Consequence of Hazard Occurring				
Very High	**Not significant**	**Minor adverse**	**Moderate adverse**	**Large adverse**	**Very large adverse**
Very High	Not significant	Significant	Significant	Significant	Significant
High	Not significant	Significant	Significant	Significant	Significant
Medium	Not significant	Not significant	Significant	Significant	Significant
Low	Not significant	Not significant	Not significant	Significant	Significant
Very Low	Not significant	Not significant	Not significant	Significant	Significant

11.9. ASSESSMENT LIMITATIONS AND ASSUMPTIONS

11.9.1. The following limitations and assumptions have been identified:

- The CRI, developed as part of the UK Climate Resilience Programme, has been used to inform 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 the Climate Risk Indicators (**Ref 11.28**). The CRI utilises 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 (RCP 8.5) 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.

11.10. REFERENCES

Ref 11.1: IEMA. (2020). 'Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation'. Available at: https://www.iema.net/download-document/237186

Ref 11.2: Standards for Highways. (2021). 'DMRB LA 114 – Climate'. Available at: https://www.standardsforhighways.co.uk/dmrb/search/d1ec82f3-834b-4d5f-89c6-d7d7d299dce0

Ref 11.3: Department for Energy and Climate Change. (2011). 'Overarching National Policy Statement for Energy (EN-1) 2011'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 11.4: Department of Energy and Climate Change. (2021). 'Draft Overarching National Policy Statement for Energy (EN-1)'. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf

Ref 11.5: Ministry of Housing Communities & Local Government. (2021). 'National Planning Policy Framework'. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

Ref 11.6: Greater London Authority. (2021). 'The London Plan.' Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

Ref 11.7: London Borough of Bexley. (2012). 'Bexley Core Strategy'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Core-Strategy.pdf

Ref 11.8: London Borough of Bexley. (2021). 'London Borough of Bexley Draft Local Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-10/Draft-local-plan-proposed-submission-document-reg-19-may-2021.pdf

Ref 11.9: Department for Environment Food & Rural Affairs. (2021). 'Climate Change Adaptation: Policy Information'. Available at: https://www.gov.uk/government/publications/climate-change-adaptation-policy-information/climate-change-adaptation-policy-information

Ref 11.10: London Borough of Bexley. (2011). 'Bexley's Environmental Sustainability Strategy'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexleys-Environmental-Sustainability-Strategy-adopted-version.pdf

Ref 11.11: London Borough of Bexley. (2022). 'Bexley Climate Change Statement and Action Plan 2022-2026'. Available at: https://www.bexley.gov.uk/about-the-council/strategies-plans-and-policies/climate-change-statement-and-action-plan-2022/welcome-bexley-climate-statement#:~:text=We%20aim%20to%20take%20practical,in%20London%20for%2017%20years.

Ref 11.12: Greater London Authority. (2018). 'London Environment Strategy'. Available at: https://www.london.gov.uk/sites/default/files/london_environment_strategy_0.pdf

Ref 11.13: UK Government. (2008). 'Climate Change Act'. Available at: https://www.legislation.gov.uk/ukpga/2008/27/contents

Ref 11.14: Ministry of Housing, Communities and Local Government and Department for Levelling Up, Housing and Communities. (2016). 'Planning Practice Guidance'. Available at: https://www.gov.uk/government/collections/planning-practice-guidance

Ref 11.15: Met Office. 'UK Climate Averages'. Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/u10hb54gm

Ref 11.16: Met Office. 'Southern England Regional Climate Profile'. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/regional-climates/southern-england_-climate---met-office.pdf

Ref 11.17: LBC. (2022). 'Travel chaos on Monday after flash flooding hits London and southern England'. Available at: https://www.lbc.co.uk/news/travel-disruption-flash-flooding-monday/

Ref 11.18: BBC News. (2018). 'How London battled the 'beast from the East''. Available at: https://www.bbc.co.uk/news/uk-england-london-43290409

Ref 11.19: Met Office. (2022). 'July Heatwave'. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2022/2022_03_july_heatwave_v1.pdf

Ref 11.20: Met Office. (2022). 'Prolonged Spell of Low Temperatues, December 2022'. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2022/2022_04_december_low_temperatures_v1.pdf

Ref 11.21: Met Office. (2022). 'Storms Dudley, Eunice and Franklin'. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2022/2022_01_storms_dudley_eunice_franklin_r1.pdf

Ref 11.22: Sky News. (2022). 'Storm Eunice: Roof of London's O2 ripped off by high winds'. Available at: https://news.sky.com/story/storm-eunice-roof-of-londons-o2-ripped-open-by-high-winds-12545218

Ref 11.23: The Guardian. (2022). 'Storm Eunice: at least four die as winds of up to 122mph batter the UK and Ireland'. Available at: https://www.theguardian.com/uk-news/live/2022/feb/18/storm-eunice-london-added-to-red-weather-warning-as-met-office-urges-millions-to-stay-indoors-live-news-updates

Ref 11.24: Met Office. (2020). ‘UK climate averages, Average maps’. Available at https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/u10hb54gm

Ref 11.25: Brittanica (N.D.) ‘Urban Climate’. Available at: https://www.britannica.com/science/urban-climate

Ref 11.26: Environment Agency. (2012). ‘Thames Estuary 2100 Plan’. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/322061/LIT7540_43858f.pdf

Ref 11.27: Met Office. (2019). ‘UK Climate Projections’. Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index

Ref 11.28: Nigel Arnell. (2021). ‘The Climate Risk Indicators’. Available at: https://uk-cri.org/

Ref 11.29: Met Office. (2019). ‘UKCP18 Factsheet: Snow’. Available at: ukcp18-factsheet-snow.pdf (metoffice.gov.uk)

Ref 11.30: EA. (2021). ‘Guidance: Flood risk assessments: climate change allowances’. Available at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

12. GREENHOUSE GASES

12.1. INTRODUCTION

12.1.1. This chapter considers the impacts of the Proposed Scheme on Greenhouse Gases (GHGs) during construction and operation, and any potential significant effects. It sets out the proposed methodology for the GHG assessment and identifies those impacts that can be scoped out of the assessment. Where necessary further assessment will be presented in the ES.

12.1.2. The requirement to consider a project's impact on, and vulnerability to, Climate Change results from Schedule 4 of the EIA Regulations (**Ref 12.1**). The EIA Regulations require:

"A description of the likely significant effects of the development on the environment resulting from… the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change"."

12.1.3. As such this chapter considers the impacts and effects of the Proposed Scheme in terms of the contribution to climate change, a GHG emissions assessment. The consideration for the vulnerability of the Proposed Scheme to climate change is addressed in **Chapter 11: Climate Resilience**.

12.2. POLICY, LEGISLATION, AND GUIDANCE

12.2.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is as follows:

Table 12-1: Greenhouse Gases – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement for Energy (EN-1) 2011 (Ref 12.2)	Sets out the Government's policy for delivery of major energy infrastructure and will be the primary basis for decision making. Section 2 (Government policy on energy and energy infrastructure development) outlines 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

Policy / Legislation / Guidance	Description
	Storage (CCS) to meet the challenge of energy security and the UK's 2050 targets.
Draft Overarching National Policy Statement for Energy (EN-1) 2021 (Ref 12.3)	The Government has published a draft update to the Overarching National Policy Statement for Energy. 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 infrastructure*". Paragraphs 3.5.1-3.5.7 set out the need for CCS infrastructure over the coming decades.
National Planning Policy Framework (NPPF) 2021 (Ref 12.4)	Presents the Government's planning policies for England and how these are to be applied. 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*

Policy / Legislation / Guidance	Description
	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 planning policy, discussed below, are relevant to their determination of the DCO Application for the Proposed Scheme.
The London Plan 2021 (Ref 12.5)	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 SI 2 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*

Policy / Legislation / Guidance	Description
	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)".
London Borough of Bexley Core Strategy 2012 (Ref 12.6)	The Core Strategy sets out the Council's long term vision for development in the borough. It aims to support a strong, sustainable and cohesive community. The following policies relate to GHGs: • Policy CS01- Achieving sustainable development; • Policy CS08 – Adapting to and mitigating the effects of climate change, including flood risk; • Policy CS15 – Achieving an integrated and sustainable transport system; • Policy CS17 - Green infrastructure; and • Policy CS20 – Sustainable waste management.
London Borough of Bexley Unitary Development Plan 2004 (Ref 12.7)	The main purpose of the Unitary Development Plan is to provide a framework for guiding development, and to show how land will be used as a resource for achieving the Council's wider objectives. In paragraph 3.14 the UDP advises that *"the Council recognises the growing public awareness and concern for the environment; particularly the national and international concerns about the consequences of global*

Policy / Legislation / Guidance	Description
	warming and the need to reduce emissions of greenhouse gases"
London Borough of Bexley Draft Local Plan 2021 (Ref 12.8)	The new Local Plan is awaiting adoption and will then replace the Bexley Core Strategy and Saved UDP policies 2012. Relevant to GHGs, Draft Policy 30 (DP30): Mitigating Climate Change, specifically states that *"New development is required to incorporate design features that help deliver radical reductions in greenhouse gas emissions, particularly CO_2 emissions, and thus help mitigate climate change impacts".*
Infrastructure Carbon Review 2013 (Ref 12.9)	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 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 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

Policy / Legislation / Guidance	Description
	Review also led to the publication of a Publicly Available Specification (PAS) on Infrastructure Carbon Management (PAS 2080:2016) (**Ref 12.20**).
Intergovernmental Panel on Climate Change (IPCC) Special Report - Global Warming of 1.5 ºC 2018 (Ref 12.10)	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 **(Ref 12.11)** reports 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 CO_2 removal to stay within the bounds of 1.5°C warming trajectory.
Climate Change Committee (CCC): The Sixth Carbon Budget The UK's path to Net Zero (Ref 12.12)	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 CO_2 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 CO_2, for example through the use of carbon capture and storage.
The Clean Growth Strategy 2017 (Ref 12.13)	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.

Policy / Legislation / Guidance	Description
	This has been further supported by the UK Carbon Capture Usage and Storage Deployment Pathway: An Action Plan **(Ref 12.14).** This action plan demonstrates the UK's commitment to playing a leading role in the development on CCS to tackle the challenges in decarbonising the economy.
Bexley's Environmental Sustainability Strategy 2011 (Ref 12.15)	Outlines LBB's responsibilities for environmental sustainability, contained in several strategies. Theme 1: *Adaptation to and mitigation of climate change* and Theme 2: *Energy management, including carbon reduction* are both relevant.
Bexley Climate Change Statement and Action Plan 2022-2026 2022 (Ref 12.16)	Outlines LLB's commitments under Part 2 of the Action Plan: *"Influencing others to reduce emissions that are not within our direct control".* This includes: • Commitment 1 - Celebrate, Promote and Protect our Natural Environment; • Commitment 4 – Enabling a greener economy; and • Commitment 5 - Empower our residents, businesses and partners to make positive changes.
Legislation	
United Nations Framework Convention on Climate Change 1992 (Ref 12.17)	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. In December 2020, the UK communicated its Nationally Determined Contribution (NDC) to the UNFCCC in line with Article 4 of the Paris Agreement. In its NDC, the UK commits to reducing economy-wide

Policy / Legislation / Guidance	Description
	greenhouse gas emissions by at least 68% by 2030, compared to 1990 levels.
The Climate Change Act 2008, as amended 2019 (Ref 12.18)	The Climate Change Act (2008) 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 June 2019, the UK Government updated this commitment to net zero emissions by 2050[16].
Guidance	
National Planning Practice Guidance (2021) (Ref 12.19)	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 2080:2016 (Ref 12.20)	PAS 2080:2016 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 (Ref 12.21)	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 Guidelines for Thermal Power Plants (Ref 12.22)	The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). The GIIP can be applied to similar infrastructure including carbon capture and storage and hydrogen.

[16] This is likely to be achieved with the use of offsets.

Policy / Legislation / Guidance	Description
IPCC Guidelines for National Greenhouse Gas Inventories (Ref 12.23)	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 (Ref 12.24)	The aim of this guidance is to assist practitioners with addressing GHG emissions assessment and mitigation in statutory and non-statutory EIA. It complements IEMA's earlier guide on Climate Change Resilience and Adaptation and builds on the Climate Change Mitigation and EIA overarching principles. The requirement to consider this topic has resulted from the 2014 amendment to the EIA Directive.

12.3. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

12.3.1. 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 conditions therefore focus on those sources of emissions subject to change between the baseline and the Proposed Scheme.

12.3.2. The latest summary of GHG emissions for 2020 within Bexley, London, and the UK (**Ref 12.25**) are presented in **Table 12-2**. The emissions sources are a subset of the total emissions for each region, chosen for their relevance to the Proposed Scheme, with the Grand Total for all emissions sources provided. These emissions have only been provided for context and are not the baseline emissions for this assessment.

Table 12-2: Emissions Sources (2020) for Bexley, London, and the UK

Emissions Sources	Bexley ($ktCO_2e$)	London ($ktCO_2e$)	UK ($ktCO_2e$)
Industry Electricity	21.0	672.6	12,309
Industry Gas	41.8	414.8	14,203
Large Industrial Installations	1.1	42.3	29,855
Industry 'Other'	23.7	748.4	16,903
Industry Total	**87.6**	**1,878.0**	**73,270**
Commercial Electricity	37.1	2,688.4	13,024
Commercial Gas	70.5	1,838.9	10,472
Commercial 'Other'	0.3	18.1	184
Commercial Total	**107.9**	**4,545.4**	**23,679**
Public Sector Electricity	9.0	710.6	4,220
Public Sector Gas	9.4	1,284.4	7,976
Public Sector 'Other'	0.0	0.0	58
Public Sector Total	**18.4**	**1,994.9**	**12,255**
Domestic Electricity	73.7	2,537.0	21,585
Domestic Gas	233.6	7,636.6	60,626
Domestic 'Other'	3.1	99.2	11,413
Domestic Total	**310.4**	**10,272.8**	**93,624**
Landfill	7.8	1,233.8	12,770

Emissions Sources	Bexley ($ktCO_2e$)	London ($ktCO_2e$)	UK ($ktCO_2e$)
Waste Management 'Other'	16.7	366.5	4,835
Waste Management Total	**24.5**	**1,600.4**	**17,605**
Other Total (transport, LULUCF and agriculture)	**238.7**	**8,077.9**	**157,247**
Grand Total*	**787.4**	**28,369.3**	**377,680**

Note: emissions have been rounded, so rounding errors may occur.

12.3.3. The baseline involves no construction activities and therefore the construction baseline is zero emissions.

12.3.4. Riverside 1 processed 782,000 tonnes of non-recyclable waste in 2021 (**Ref 12.26**). Heat produced from the combustion process drives a turbine to generate electricity, enough to power 160,000 homes (**Ref 12.27**).

12.3.5. 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).

12.3.6. The information gathered and presented within the ES for Riverside 2 will inform the baseline relevant to GHGs, where relevant.

FUTURE BASELINE

12.3.7. The future baseline will assume that Riverside 2 is in operation. For both Riverside 1 and Riverside 2, their operation is expected to operate to their maximum capacity for processing waste (and thus producing GHGs) into the future. The operation of the Proposed Scheme will not change this.

12.3.8. Data from Riverside 1, Riverside 2 and the Proposed Scheme will be utilised in the next stages of the GHG emissions assessment, in the PEIR and ES to support contextualisation of the assessment of effects arising from the Proposed Scheme. The purpose of the operation of the Proposed Scheme is to capture the CO_2 emissions released in the baseline from Riverside 1 and Riverside 2 in the future baseline. Data about these emissions will therefore be used to calculate the avoided CO_2 emissions during the operation of the Proposed Scheme.

12.4. STUDY AREA

12.4.1. The assessment of GHG emissions is not restricted by geographical area, instead focussing on any increase or decrease in emissions as a result of the Proposed Scheme, wherever that may be. This includes:

- 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.
- Operation emissions (increase or reduction) which result from the operation of the Proposed Scheme and any shifts in energy usage that may occur. In this case, GHG emissions include those for embodied emissions arising from materials and waste for the operation of the Proposed Scheme, operational energy and water use.

12.5. SENSITIVE RECEPTORS / RESOURCES

12.5.1. 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 emissions contributing to impacts on natural and human systems. GHG emissions result in the same global effects wherever and whenever they occur and, therefore, the sensitivity of different human and natural receptors is not considered.

12.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

12.6.1. In line with IEMA guidance (**Ref 12.24**), it is important to incorporate measures to reduce GHG emissions at an early stage, this means that mitigation should be considered at all stages of design, not just as part of the EIA process. The sections below outline likely proposed GHG reduction measures for construction and operation of the Proposed Scheme.

CONSTRUCTION PHASE

12.6.2. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- Design optimisation to reflect the carbon reduction hierarchy (detailed below and found in clause 6.1.4 of PAS 2080:2016 (**Ref 12.20**):
  - reduce the number of elements required for the Proposed Scheme;
  - reduce the requirement for construction materials by smart design;
  - substitute-in and use alternative raw materials and resources (e.g. using low temperature asphalt) with lower embodied carbon; and
  - use efficient construction processes, such as embracing design for manufacture and assembly.

- Maximising the opportunity to use more sustainable materials by specifying, in procurement documentation, that materials and products with reduced embodied carbon emissions, and materials/resources featuring recycled content (where safe and of sufficient integrity for engineering), supported with eco- and carbon labels or verified Environmental Product Declarations (EPD) are favoured and should be used.
- Designing, specifying and constructing the Proposed Scheme with a view to maximising the operational lifespan and minimising the need for maintenance and refurbishment (and thus reducing the frequency of releasing associated GHG emissions).
- Specifying efficient ancillary infrastructure and equipment (such as lighting and telecommunications) that is long-lasting and chosen for its durability and energy efficiency credentials.
- Using locally sourced materials where available and practicable to minimise the distance materials are transported from source to Site.
- Using more modern and efficient construction plant and delivery vehicles, and/or those powered by electricity from alternative/lower carbon fuels.

OPERATION PHASE

12.6.3. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- Specifying efficient ancillary infrastructure and equipment such as lighting, the battery energy storage system and/or the emergency standby generators;
- Maximising the operational effectiveness (% carbon capture) and minimising the parasitic load;
- Maximising the operational lifespan and minimising the need for maintenance and refurbishment (and all associated emissions);
- Maximising the potential for reuse and recycling of materials/elements at the end-of-life stage;
- Operating, maintaining and refurbishing the Proposed Scheme using energy efficient equipment; and
- Consider enhancing the planting within the Site Boundary, where practical to sequester carbon from the atmosphere.

12.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

12.7.1. In relation to the PAS 2080:2016 lifecycle stages, the potential likely significant effects associated with the construction phase include those elements set out in **Table 12-3**.

Table 12-3: Key Emissions Sources in Construction Phase

Lifecycle Stage Impacts (with codes as per PAS 2080:2016)	Potential Sources of Emissions (not exhaustive)
Product Stage (manufacture and transport of raw materials to suppliers) (A1-3)	Embodied emissions associated with extraction and manufacturing of the required raw materials.
Transport of Materials to Site (A4)	Emissions from fuel and electricity used in vehicles transporting materials to Site.
Plant and Equipment Use during Construction (A5)	Emissions from fuel and electricity used in plant and equipment onsite.
Transport of Waste (A5)	Emissions from fuel/energy used in vehicles transporting waste materials from construction, demolition (the Middleton Jetty and Belvedere Power Station Jetty (disused jetty)) and excavation (for the Proposed Scheme including the Proposed Jetty), to destinations away from the Site.

OPERATION PHASE

12.7.2. In relation to the PAS 2080:2016 lifecycle stages, the potential likely significant effects associated with the operation phase include those elements set out in **Table 12-4**.

Table 12-4: Key Emissions Sources in Operation Phase

Lifecycle Stage Impacts (with codes as per PAS 2080:2016)	Potential Sources of Emissions (Not Exhaustive)
Operation (B1)	Riverside 1 and Riverside 2 (once operational) are expected to operate to their maximum capacities for processing waste (and thus producing GHGs) into the future. The assessment of these GHGs was considered in the relevant applications for development consent and operation of the Proposed Scheme will not change this. Therefore the GHG emissions associated with the waste coming to Riverside 1 and Riverside 2 will not be assessed as part of this Proposed Scheme, but the data from those assessments will be used to contextualise the results of the assessment of the Proposed Scheme. The Carbon Capture and Storage Project will remove up to 95% of the CO_2 from the flue gas from both Riverside 1 and Riverside 2. CO_2 captured through the carbon capture process will therefore avoid the release of GHG emissions. The remaining 5% of CO_2 from the flue gas, will result in the release of GHG emissions. There is likely to be CO_2 venting as part of the Carbon Capture and Storage Project as well as possible releases of ozone (O_3) and hydrogen (H_2) from the Hydrogen Project. Embodied emissions associated with extraction and manufacturing of refrigerants (from Liquified CO_2 Storage as part of the Carbon Capture and Storage Project and potentially hydrogen in liquid state as part of the Hydrogen Project). Waste streams generated by these facilities will require regular offsite disposal, including but not limited to: • filter cake form Filtration Unit (Carbon Capture and Storage Project); • spent solvent from a filtration and reclamation system (Carbon Capture and Storage Project); and • desiccant beds from the Hydrogen Project (these beds will mostly regenerate but will need to be changed periodically).

Lifecycle Stage Impacts (with codes as per PAS 2080:2016)	Potential Sources of Emissions (Not Exhaustive)
Maintenance, Repair, Replacement, Refurbishment (B2-5)	Embodied emissions and emissions from transport and plant associated with maintenance, repair, replacement, and refurbishment. Emissions arising from maintenance dredging of the riverbed to maintain the Proposed Jetty (and approaches) at correct depth to accommodate marine vessels, transportation and disposal of the dredged materials offsite.
Operational Water Use (B7)	Emissions from the use of water for the Carbon Capture Project (e.g. for dilution of the amine initial fill and cooling systems) and the Hydrogen Project (e.g. for water electrolysis and cooling systems).
Solvent Used for The Carbon Capture Project (B8)	Solvent materials required for the operation of the Proposed Scheme would result in embodied GHG emissions.
End-user Emissions (B9/D)	Emissions associated with the transportation of CO_2 and hydrogen offsite.

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

12.7.3. With reference to all PAS 2080:2016 lifecycle stages, the impacts scoped in or out for GHGs are as follows:

Table 12-5: Greenhouse Gas - Scoped In or Out of Further Assessment

Impacts	Phase	Scoped In	Scoped Out	Justification
Product Stage (manufacture and transport of raw materials to suppliers) (A1-3)	Construction	✓		Raw materials required for Proposed Scheme would result in embodied emissions that have the potential to be large.
Transport of Materials to Site (A4)	Construction	✓		Construction phase emissions from fuel/energy consumption due to the delivery of material to site have the potential to be large.
Plant and Equipment Use during Construction (A5)	Construction	✓		Emissions from the plant and equipment used during construction of the Proposed Scheme have the potential to be large.
Transport of Waste (A5)	Construction	✓		Emissions from fuel/energy consumption due to the transport of waste materials have the potential to be large.
Disposal of Waste (A5)	Construction		✓	Emissions from the disposal of waste materials is not expected to be large as it will predominantly comprise inert waste from demolition and excavation activities.
Land use, Land Use Change and Forestry (A5)	Construction		✓	Emissions from the change in land use from existing grassland (including Crossness LNR) is not expected to be large.

Impacts	Phase	Scoped In	Scoped Out	Justification
Operation (B1)	Operation	✓		Emissions from operational processes of the Proposed Scheme are expected to be large. This is to include (not exhaustive): solvents required to operate the Proposed Scheme and any emissions from the production processes for the Proposed Scheme.
Maintenance, Repair, Replacement, Refurbishment (B2-5)	Operation	✓		The Proposed Scheme is not designed with the expectation of any significant plant maintenance and repair activities, or refurbishment being required, and therefore emissions due to these activities are expected to be minimal. This element is scoped out of further assessment. However, to maintain the riverbed at the correct depth to accommodate marine vessels, regular dredging is expected to be required. The transportation and disposal of this dredged material and the associated emissions are expected to be large. Therefore, this element of B2-5 will be scoped in for further assessment.
Operational Energy Use (B6)	Operation		✓	The Proposed Scheme is expected to be powered by Riverside 1 and 2, albeit there may be a limited demand for electricity from the grid at certain times. However, this is anticipated to be limited in practice and, recognising the decarbonisation of the national grid, emissions are expected to be minimal and scoped out of the assessment. There may also be a limited demand to use backup power generators (for example a battery energy storage system and/or emergency standby generators), to power the critical loads in the event of power failure. Intermittent testing of the backup systems will

Impacts	Phase	Scoped In	Scoped Out	Justification
				generate emissions, but these are expected to be minimal and scoped out of the assessment.
Operational Water Use (B7)	Operation	✓		A considerable quantity of process water would be required for operation of the facilities.
Land Use, Land Use Change and Forestry (B8)	Operation		✓	The reduction in carbon sequestration due to the land use change from the Proposed Scheme is not considered to be large.
Solvent Used for the Operation of the Proposed Scheme (B8)	Operation	✓		Solvent materials required for operation of the Proposed Development would result in embodied GHG emissions and have the potential to be large.
End-user Emissions (B9/D) **The Carbon Capture and Storage Project (Transport)**	Operation	✓		Emissions associated with transportation of the captured CO_2 offsite to its end use (storage) have the potential to be large and are therefore scoped in for assessment. As exact vehicle and vessel movements are unknown, a worst-case scenario will be applied.

Impacts	Phase	Scoped In	Scoped Out	Justification
End-user Emissions (B9/D) **The Carbon Capture and Storage Project (Storage)**	Operation		✓	The final storage of captured CO_2 and the development of the proposed storage locations offshore are outside the scope of this assessment and will therefore not be assessed. This is because it is covered under separate planning considerations and jurisdiction.
End-user Emissions (B9/D) **The Hydrogen Project (Transport and Use)**	Operation	✓		**Transport** The method of transportation (pipeline, land based or vessel) of hydrogen is currently unknown due to the range of possible end uses for the hydrogen. It will be determined as part of the ongoing design process and assessed accordingly in the PEIR/ES. Worst-case scenarios will be assumed. **Use - Combustion** The use for the produced hydrogen is currently unknown, however it is promoted in policy as a promising future fuel. The GHG impact of hydrogen use as an alternative fuel source will be determined as part of the ongoing design process and assessed accordingly in the PEIR/ES.
Decommissioning Process (C1)	End of life		✓	The potential effects of the decommissioning phase of the Proposed Scheme have been scoped out. This is due to uncertainties around

Impacts	Phase	Scoped In	Scoped Out	Justification
Transport and Disposal of Materials (C2-4)	End of life		✓	deconstruction techniques at the Proposed Scheme's end of life (in a minimum of 25 years' time) relating to the carbon intensity of fuels used within these deconstruction techniques. It is therefore not possible to proportionally assess impacts and effects during decommissioning. For more information on the scope of decommissioning, refer to **Chapter 3: EIA Methodology**.

12.8. PROPOSED ASSESSMENT METHODOLOGY

12.8.1. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with LLB.

12.8.2. 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 lifecycle of the Proposed Scheme addressing:

- Construction phase - e.g. embodied emissions associated with materials, transportation of materials to site and waste/arisings from the Site, and the construction process; and
- Operation phase - e.g. operation of lighting and controls, maintenance and replacement of original materials, as well as emissions and avoided emissions from the Proposed Scheme.

12.8.3. For all PAS 2080:2016 lifecycle stages and sub-stages of the Proposed Scheme, the assessment will include the following:

- collection of available data/information on the scale of GHG emitting activities (e.g. tonnes concrete, litres of fuel, kWh electricity) and GHG capturing activities for the baseline and for the Proposed Scheme. In each case this will cover the whole study period (minimum design life of 25 years). This is also to include developments in end use transportation of CO_2 and hydrogen as the design and consultation of the Proposed Scheme progresses; and
- calculation of the GHG emissions by applying a suitable emissions factor (per unit of emissions generating or capturing activity).

12.8.4. Emissions calculations will focus on emissions annually and throughout the Proposed Scheme lifecycle. Values will be reported as tonnes of CO_2 equivalents (tCO_2e).

12.8.5. The assessment of construction and operation impacts will be undertaken in line with the following guidance:

- PAS 2080:2016 (**Ref 12.20**);
- ISO 14064-1:2018 (**Ref 12.28**);
- GHG Protocol (**Ref 12.21**);
- IFC Environmental, Health, and Safety Guidelines for Thermal Power Plants (**Ref 12.22**); and
- IPCC Guidelines for National Greenhouse Gas Inventories (**Ref 12.23**).

SIGNIFICANCE OF EFFECT CRITERIA

12.8.6. Any magnitude of emitted or avoided GHG emissions makes a cumulative contribution to climate change (positive or negative).

12.8.7. Significance of GHG impacts is assessed in line with IEMA guidance (**Ref 12.24**); a development's emissions should be based on its net impact over its lifetime, which may be positive, negative 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.

12.8.8. In order to provide context to the GHG emissions, and as set out in the IEMA guidance, the estimated GHG emissions arising from the Proposed Scheme will be compared with the respective UK carbon budget (**Ref 12.29**), shown in **Table 12-6**, which have been set by the UK Government covering 2023 to 2037. Further contextualisation on more local or sector carbon budgets will also be considered as well as any cumulative impacts on GHG emissions (with reference to **Section 12.5**).

Table 12-6: UK Carbon Budget

Carbon Budget Period	UK Carbon Budget (MtCO2e)
Fourth: 2023-2027	1,950
Fifth: 2028-2032	1,725
Sixth: 2033-2037	965

12.9. ASSESSMENT LIMITATIONS AND ASSUMPTIONS

12.9.1. The following limitations and assumptions have been identified:

- The assessment will assume that there will be no change in the operating hours in the baseline and the Proposed Scheme for Riverside 1 and Riverside 2.
- The assessment is expected to take place before the detailed design is finalised and a contractor is onsite, and as such there will be some uncertainty regarding the types and quantities of materials to be used in construction. Where data is unavailable, worst-case reasonable assumptions will be used.
- The final storage of captured CO_2 and the development of the proposed storage locations offshore are outside the scope of this assessment.
- The method of collection and transportation of hydrogen will be determined as part of the ongoing design process and assessed accordingly in the ES.
- The assessment of significance will be based, in part, on professional judgement.

12.10. REFERENCES

Ref 12.1: Gov UK. (2017). 'Schedule 4 of the EIA Regulations 2017'. Available at: https://www.legislation.gov.uk/uksi/2017/571/schedule/4/made

Ref 12.2: Department of Energy and Climate Change. (2011). 'Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 12.3 Department for Business, Energy & Industrial Strategy. (2021). 'Draft Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf

Ref 12.4: Ministry of Housing Communities & Local Government. (2021). 'National Planning Policy Framework'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf

Ref 12.5: Greater London Authority. (2021). 'The London Plan 2021'. Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

Ref 12.6: London Borough of Bexley. (2012). 'Bexley Core Strategy'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Core-Strategy.pdf

Ref 12.7: London Borough of Bexley. (2004). 'Unitary Development Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-12/Bexley-unitary-development-plan-written-statement-2004.pdf

Ref 12.8: London Borough of Bexley. (2021). 'Draft Local Plan 2021'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-10/Draft-local-plan-proposed-submission-document-reg-19-may-2021.pdf

Ref 12.9: HM Government. (2013). 'Infrastructure Carbon Review'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/260710/infrastructure_carbon_review_251113.pdf

Ref 12.10: International Panel on Climate Change (IPCC). (2018). 'Special Report - Global Warming of 1.5 ºC.' Available at: https://www.ipcc.ch/sr15/

Ref 12.11: International Panel on Climate Change (IPCC). (2023). 'Synthesis Report of IPCC Sixth Assessment Report (AR6) – Summary for Policy Makers'. Available at: https://report.ipcc.ch/ar6syr/pdf/IPCC_AR6_SYR_SPM.pdf

Ref 12.12: Committee on Climate Change (CCC). (2020). 'The Sixth Carbon Budget The UK's path to Net Zero'. Available at: https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf

Ref 12.13: HM Government. (2017). 'The Clean Growth Strategy Leading the way to a low carbon future'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf

Ref 12.14: HM Government. (2018). 'Clean Growth The UK Carbon Capture Usage and Storage deployment pathway: An Action Plan' Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/759637/beis-ccus-action-plan.pdf

Ref 12.15: London Borough of Bexley. (2011). 'Bexley's Environmental Sustainability Strategy'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexleys-Environmental-Sustainability-Strategy-adopted-version.pdf

Ref 12.16: London Borough of Bexley. (2022). **'**Bexley Climate Change Statement and Action Plan 2022-2026'. Available at: https://www.bexley.gov.uk/about-the-council/strategies-plans-and-policies/climate-change-statement-and-action-plan-2022/our-climate-commitments

Ref 12.17: United Nations Climate Change. (n.d). 'United Nations Climate Change webpage'. Available at: https://unfccc.int/

Ref 12.18: HM Government. (2019). 'The Climate Change Act 2008 (2050 Target Amendment) Order 2019'. Available at: https://www.legislation.gov.uk/ukdsi/2019/9780111187654

Ref 12.19: Ministry of Housing, Communities and Local Government and Department for Levelling Up, Housing and Communities. (2021). 'Planning Practice Guidance'. Available at: https://www.gov.uk/government/collections/planning-practice-guidance

Ref 12.20: BSI. (2016). 'Publicly Available Specifications: 2080 Carbon management in Infrastructure'. Available at: https://www.carbontrust.com/what-we-do/assurance-and-labelling/pas-2080-carbon-management-in-infrastructure#:~:text=What%20is%20PAS%202080%3F,intelligent%20design%2C%20construction%20and%20use

Ref 12.21: Greenhouse Gas Protocol. (Various). Available at: https://ghgprotocol.org/

Ref 12.22: IFC. (2017). 'Environmental, Health, and Safety Guidelines for Thermal Power Plants'. Available at: https://www.ifc.org/wps/wcm/connect/9ec08f40-9bc9-4c6b-9445-b3aed5c9afad/Thermal+Power+Guideline+2017+clean.pdf?MOD=AJPERES&CVID=lNwcJZX

Ref 12.23: IPCC. (2006). 'Guidelines for National Greenhouse Gas Inventories'. Available at: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf

Ref 12.24: IEMA. (2022). 'Assessing Greenhouse Gas Emissions and Evaluating Their Significance'. Available at: https://www.iema.net/

Ref 12.25: HM Government, Department for Business, Energy & Industrial Strategy. (2022). 'UK greenhouse gas emissions national statistics 2021'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1064923/2021-provisional-emissions-statistics-report.pdf

Ref 12.26: Cory Group. (2021). The Journey of Waste Annual Report'. Available at: https://www.corygroup.co.uk/application/files/1216/5642/7711/Cory_AR2021_web.pdf

Ref 12.27: Cory Group. (2021). 'Cory Sustainability Report 2021'. Available at: https://www.corygroup.co.uk/application/files/7216/6066/0318/Cory_Sustainability_Report_2021.pdf

Ref 12.28: ISO. (2018). 'ISO Standard 14064-1:2018 Greenhouse gases'. Available at: https://www.iso.org/standard/66453.html

Ref 12.29: Department of the Environment, Climate and Communications. (2022). 'Carbon Budgets'. Available at: https://www.gov.ie/en/publication/9af1b-carbon-budgets/

13. POPULATION, HEALTH, AND LAND USE

13.1. INTRODUCTION

13.1.1. This chapter considers the impacts of the Proposed Scheme on population, human health, and land use during construction and operation, and any potential significant effects. It sets out the proposed methodology for the Population, Human Health, and Land Use assessment and identifies those impacts that can be scoped out of the assessment. Where necessary further assessment will be presented in the ES.

13.2. POLICY, LEGISLATION, AND GUIDANCE

13.2.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is detailed in **Table 13.1**.

Table 13-1: Population, Human Health, and Land Use – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011 (Ref 13.1)	Presents the national policy for the delivery of major energy infrastructure. 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."* 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".*

Policy / Legislation / Guidance	Description
Draft Overarching National Policy Statement for Energy (EN-1) 2021 (Ref 13.2)	The draft National Policy Statement (NPS) sets out national policy for the energy infrastructure and is due to replace the 2011 Policy Statement. Paragraph 4.3.1 states *"Energy production has the potential to impact on the health and well-being ("health") of the population. Access to energy is clearly beneficial to society and to our health as a whole. However, the production, distribution and use of energy may have negative impacts on some people's health."* Paragraph 4.3.4 states *"new energy infrastructure may also affect the composition and size of the local population, and in doing so have indirect health impacts, for example if it in some way affects access to key public services, transport or the use of open space for recreation and physical activity."*
National Planning Policy Framework (NPPF) 2021 (Ref 13.3)	The National Planning Policy Framework (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."*
The London Plan 2021 (Ref 13.4)	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. The London Plan presents policies relevant to the population, human health and land use assessment including: • GG1: Building Strong and Inclusive Communities; • GG3: Creating a Healthy City; • D1: London's Form, Character and capacity for Growth; • D14: Noise; • SI1: Improving Air Quality;

Policy / Legislation / Guidance	Description
	• T2: Healthy Streets; and • T4: Assessing and Mitigating Transport Impacts (which covers the walking and cycling network).
London Borough of Bexley Core Strategy 2012 (Ref. 13.5)	The Core Strategy sets out the Council's long-term vision for development in the borough. It aims to support a strong, sustainable and cohesive community. The key objective of the Strategy is *"To promote development that assists regeneration and renewal within the borough and enhances the quality of life of all Bexley residents, and encourage development that promotes social inclusion, addresses local social and economic needs and provides a better environment."*
London Borough of Bexley Unitary Development Plan 2004 – 'Saved' Policies (Ref 13.6)	The main purpose of the Unitary Development Plan is to provide a framework for guiding development, and to show how land will be used as a resource for achieving the Council's wider objectives. Although this plan has been replaced by the Core Strategy a number of policies have remained as 'saved' policies. Those of relevance to population and human health include: • ENV19 – Other Open Space; • ENV28 – Local Nature Reserves; • TAL9 & 10 – Public Footpaths; and • TAL12 - Outdoor recreation facilities – water. It should be noted that these 'saved' policies in Bexley's UDP will be replaced (either in full or in part) by policies set out in the forthcoming Local Plan documents.
London Borough of Bexley Draft Local Plan 2021 (Ref 13.7)	The new Local Plan is awaiting adoption and will rhwn replace the Bexley Core Strategy and Saved UDP policies 2012. Relevant policies include: • DP15: Providing and Protecting Social and Community Infrastructure; and • DP16: Publicly Accessible Open Space.

Policy / Legislation / Guidance	Description
Southeast Inshore Marine Plan 2021 (Ref 13.8)	The Southeast Marine Plan intends 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, which stretches from Felixstowe in Suffolk to west of Dover in Kent. It incorporates the River Thames up to and including Teddington Lock. Relevant policies 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.
Bexley Open Space Strategy 2008 (Ref 13.9)	Presents 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.
Legislation	
Countryside and Rights of Way (CROW) Act 2000 (Ref 13.10)	The CROW Act makes provision for and aims to protect public access to the countryside. It 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 (Ref 13.11)	The legislation to protect people from discrimination in the workplace and in wider society, addressing: • age • disability • gender reassignment • marriage and civil partnership • pregnancy and maternity • race • religion or belief • sex • sexual orientation
Localism Act 2011 (Ref 13.12)	The Localism Act gives rights and powers to both communities and individuals. It is relevant in the context

Policy / Legislation / Guidance	Description
	of the Proposed Scheme due to its proximity to recreational facilities.
Guidance	
National Planning Practice Guidance (2021) (Ref 13.13)	Explains the processes and tools that can be used through the planning system in England.
Planning Practice Guidance - Open Space, Sports and Recreation Facilities, Public Rights of Way and Local Green Space 2014 (Ref 13.14)	Guidance on how planning proposals should consider potential impacts on open space, sports and recreation facilities and public rights of way.
Planning Practice Guidance - Healthy and Safe Communities 2014 (Ref 13.15)	This sets out guidance on how new planning proposals should promote health, wellbeing and safety.
Bexley Connected Communities 2019 – 2023 (Ref 13.16)	Establishes 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.

13.3. BASELINE CONDITIONS AND FUTURE BASELINE

13.3.1. The key sources of information on baseline population, human health, and land use conditions will be:

- Fingertips Public Health Data (**Ref. 13.17**);
- English Indices of Multiple Deprivation (**Ref. 13.18**);
- LBB Joint Strategic Needs Assessment (**Ref. 13.19**);
- London Datastore, London Area Profiles (**Ref. 13.20**);
- Official Census and Labour Market Statistics (NOMIS) (**Ref.13.21**);
- MMO Marine Activity Data (**Ref.13.22**); and
- Any relevant websites for recreational groups, facilities and activities (inclusive of the Riverside Campus).

13.3.2. The information gathered and presented within the ES for Riverside 2 will inform the baseline relevant to population, human health and land use.

13.3.3. A short summary of the baseline conditions are presented below.

EXISTING BASELINE

Population

13.3.4. The Proposed Scheme is located within the London Borough of Bexley (LBB). According to NOMIS data (**Ref. 13.21**), the total population of the Borough in 2021 was 246,500. The working age population is lower than the London average (68.8%) and the same as the national average, with 62.9% of Bexley residents aged between 16-64. According to data from London Area Profiles (2018), the population in Bexley 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 London average of 11.7% (**Ref. 13.20**).

13.3.5. Of the 317 local authorities in England, Bexley is ranked 190th in terms of overall deprivation, where a rank of 1 is the most deprived and a rank of 317 is the least deprived (**Ref. 13.18**).

13.3.6. The proportion of people aged between 16-64 in Bexley with no qualifications is higher than the national (6.6%) and regional (5.5%) averages at 7.4% (**Ref. 13.21**). Those people achieving degree level qualifications (NVQ4 and above) in Bexley (42.4%) is somewhat lower than both the regional (59.0%) and national (43.6%) averages (**Ref 13.21**). Overall, this suggests a slightly lower skilled workforce within Bexley compared with the Greater London region, and the England averages.

Human Health

13.3.7. The overall health of people in Bexley is varied compared with the England average. In relation to life expectancy, within Bexley the average life expectancy is 79.5 years for males and 83.5 years for females, similar to figures in 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) (**Ref. 13.17**).

13.3.8. The Public Health England local authority profile for Bexley (**Ref. 13.17**) 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.

Land Use and Accessibility

Private Property and Housing

13.3.9. The Study Area (**Section 13.4**) is predominantly industrial, however, there are a number of residential properties south of the Site Boundary. The residential area of Belvedere is approximately 155m south of the Site Boundary. Thamesmead residential area is located approximately 1.7km North-West of the Site Boundary.

13.3.10. In addition, there is one gypsy and traveller site located within 500m of the Site Boundary. The site is located off Jenningtree Way in Belvedere and has 14 pitches

(13 private pitches and one owned by LBB). This is the largest site in the Borough and has potential for an increase in capacity to 18 pitches (**Ref. 13.23**).

Community Land and Assets

13.3.11. The following assets have been identified in proximity to the Proposed Scheme:

- The Engine House, co-working community space – approximately 400m south of the Site Boundary; and
- Snap Fitness Gym – approximately 350m southeast of the Site Boundary.

Businesses and Allocated Business Areas

13.3.12. The Proposed Scheme is located within Belvedere Industrial Area, hosting businesses predominantly associated with manufacturing and logistics. Larger units include Iron Mountain Records Storage Facility, Asda Belvedere Distribution Centre, Amazon UK DBR1, Lidl Warehouse / Belvedere Regional Distribution Centre and Asda ASC Recycling Centre.

13.3.13. Apart from the Applicant's operations, Munster Joinery Warehouse is the only business located within the Site Boundary. This is located on the western side of Norman Road, the main access to the Proposed Scheme. Further information on the business operations at the Munster Joinery Warehouse is provided in **Chapter 14: Socio-economics**. The worst-case scenario would be the demolition of Munster Joinery Warehouse; if necessary, the Applicant would seek to relocate this business.

13.3.14. The Proposed Scheme is located within the Bexley Riverside Opportunity Area. This area has been identified in the London Plan (**Ref 13.4**) as having potential for 6,000 new homes and 19,000 new jobs by 2041. There are some terrestrial businesses within the Study Area that rely upon access to the River Thames for the transportation of materials and goods, some of which require the use of jetties.

13.3.15. There are two jetties located within the Site Boundary: Middleton Jetty, currently operated as part of Riverside 1 and which will also be used for Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken); and the Belvedere Power Station Jetty (disused jetty). Upstream (~500m) of the Site, the Crossness Sewage Treatment Works Jetty serves as an operational base for the vessels Thames Bubbler and Thames Vitality. Further details on these jetties can be found in **Chapter 18: Marine Navigation**.

13.3.16. There are sightseeing and pleasure vessel tours whose businesses rely upon use of the River Thames. Further details on these businesses have been detailed under the recreation baseline below.

13.3.17. Crossness Sewage Treatment Works is located approximately 230m to the west of the Site Boundary. Within the Crossness Sewage Treatment Works there is a Grade I listed building – Crossness Pumping Station. Further information on the listed building in provided in **Chapter 8: Heritage**. The Crossness Pumping Station provides guided tours and open days. This site is located outside of the Study Area, but is linked to the Crossness Sewage Treatment Works, which is adjacent to the Proposed Scheme.

Public Access for Walkers and Cyclists

13.3.18. The southeast section of the England Coast Path intersects the Site Boundary. This extends from Woolwich in the west to Grain in Kent in the east. The path also provides a link to the Thames Path at Woolwich (meaning the England Coast Path itself is not located within the Site Boundary). Together the England Coast Path and Thames Path create 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 (**Ref. 13.23**).

13.3.19. In addition, there are three public rights of way (PRoW) located within the Site Boundary: FP2; FP3; and FP4. There are two further PRoWs located within the Study Area: FP1 and FP242 (**Ref. 13.24**).

13.3.20. National Cycle Network (NCN) Route 1 intersects the Site Boundary. This route provides an off-road route alongside the Thames River and overlaps with part of the England Coast Path / Source to Sea National Trail.

13.3.21. The recreational routes detailed in this section are shown on **Figure 2-1**, located within **Chapter 2: Site and Proposed Scheme Description**.

Recreation

13.3.22. Erith Rowing Club is the nearest recreational club that relies upon access to the River Thames and is located approximately 2.6km downstream from the Proposed Scheme. Approximately 1.5km southeast is the Erith River Wharf Visitor Mooring with space for two vessels. The Erith Yacht Club, located approximately 4km downstream, also uses this stretch of the River Thames for sailing events. It is understood that the Greenwich Yacht Club also uses this stretch of the River Thames for sailing events.

13.3.23. There are a number of sightseeing and pleasure boat tours that 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. Neither of the boat routes use the section of the River Thames within the Site Boundary. The River Thames also provides angling opportunities. There are fishing marks at Thamesmead (2.5km west) and Erith Pier (3.2km southeast) and it is possible to fish directly from the river wall.

13.3.24. Crossness LNR is partially located within the Site Boundary, which includes bird hides, informal trails and paddocks for horses. FP 2 runs through an open, grassed area of land immediately west and south of the Site Boundary: this route links into Southmere Park.

FUTURE BASELINE

13.3.25. Existing commercial businesses within the Site Boundary would remain at their current locations should the Proposed Scheme not proceed. These include Riverside 1, including Middleton Jetty, and the Munster Joinery Warehouse. Riverside 2 would also be operational in the future baseline.

13.3.26. The population in Bexley is anticipated to grow by 3.9% over the next 10 years (2023-2033) (**Ref. 13.20**). This growth is likely to put strain on existing services and require additional housing, facilities, services and infrastructure.

13.3.27. Development of the Bexley Riverside Opportunity Area as well as Riverside 2 becoming operational will bring about additional housing and employment opportunities, which could increase the population more locally within Belvedere.

13.4. STUDY AREA

13.4.1. The Study Area for Population, Human 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 and human health.

Land Use and Accessibility Terrestrial

13.4.2. **Terrestrial businesses and allocated business areas:** Those businesses and allocated business area within 100m/in the immediate vicinity of the Site Boundary, or those which have a direct means of access within the Site Boundary.

13.4.3. **Public access for walkers and cyclists:** A 500m Study Area around the Site Boundary will be used for the assessment of change in accessibility and amenity value of PRoW and routes used by walkers and cyclists.

13.4.4. **Terrestrial recreation:** Recreational facilities located within 500m of the Site Boundary, or those which have a direct means of access within the Site Boundary.

13.4.5. **Community land and assets:** Community land and assets located within 500m of the Site Boundary, or those which have a direct means of access within the Site Boundary.

13.4.6. **Private property and housing:** Private property and housing located within 500m of the Site Boundary, or those which have a direct means of access within the Site Boundary.

Marine

13.4.7. **Business that rely upon access to the River Thames:** The stretch of River Thames within the Site Boundary as well as any area that extends beyond the Site Boundary where fluvial geomorphology could be affected (see **Chapter 10: Water Environment and Flood Risk** for further details).

13.4.8. **Recreational users of the River Thames:** The stretch of River Thames within the Site Boundary as well as any area that extends beyond the Site Boundary where fluvial geomorphology could be affected (see **Chapter 10: Water Environment and Flood Risk** for further details).

HUMAN HEALTH

13.4.9. For human health, the Study Area has been determined by the extent and characteristics of the Proposed Scheme, and the communities potentially directly and

indirectly affected by the Proposed Scheme. The smallest jurisdiction boundaries for the Proposed Scheme are Lower Super Output Areas (LSOA) which lie within or adjacent to the Site Boundary.

13.4.10. Where possible, LSOAs have formed the basis of the Study Area for health because they are the communities that are most likely to experience direct and/or greater impacts.

13.4.11. The various area profiles are as follows:

- National: England;
- Regional: London;
- Local Authority: The London Borough of Bexley;
- Wards: Belvedere, Thamesmead East and Erith; and
- LSOAs: Bexley 001A and Bexley 003B.

13.5. SENSITIVE RECEPTORS / RESOURCES

13.5.1. The baseline has identified the following sensitive receptors within the Study Area:

- Terrestrial and marine businesses (particularly those located in the Belvedere Industrial Area);
- individuals who reside in private property or housing within the local area (including the gypsy and traveller site);
- publicly accessible routes and PRoW; and
- recreational receptors (including both terrestrial and marine).

13.5.2. Human health focuses on the potential effects on vulnerable groups who are most likely to experience health impacts, due to the nature of the Proposed Scheme:

- Older people;
- People with existing health conditions;
- Unemployed and low-income groups; and
- Socially excluded or isolated groups.

13.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION PHASE

13.6.1. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- With the exception of the Munster Joinery Warehouse, access to businesses would be maintained throughout the construction period;
- 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;

- Permanent diversion of PRoW routes should be clearly signposted and local groups should be engaged;
- Local users should be informed on the permanent changes to the Crossness LNR;
- Mitigation measures from other technical environmental assessment topics, including Landside Transport, Air Quality, Noise and Vibration, Townscape and Visual and Socio-economics to be incorporated into an Outline CoCP;
- A Communication Strategy will be prepared to ensure that local residents and other stakeholders are made aware of the commencement of construction works; and
- Navigation routes on the River Thames for recreational and commercial vessels would be maintained (see **Chapter 18: Marine Navigation** for further information).

OPERATION PHASE

13.6.2. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- Any additional barge moorings 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 (see **Chapter 18: Marine Navigation** for further information).
- Mitigation measures from other technical environmental assessment topics, including Townscape and Visual Impact, Air Quality, Noise and Vibration as well as Socio-economics could also reduce impacts on human health.

13.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

13.7.1. The potential likely significant effects associated with the construction phase include:

Terrestrial

- Access to businesses to be temporarily disrupted during construction due to the increases in construction traffic. There is also potential for long term effects on Munster Joinery Warehouse, which, for the purposes of a worst-case assessment, could be lost. If it is to be lost the Applicant would seek to relocate the business if appropriate;

  Effects to arise from disruption and possible permanent diversions / shortening to PRoW, long distance walking routes and NCN routes; and
- Disturbance to recreational users and partial change to Crossness LNR and informal green space surrounding the Site Boundary.

Marine

- Temporary effects on recreational users of the River Thames due to increased disturbance on the river; and

- Disturbance to those businesses reliant upon access to the River Thames due to additional river traffic and dredging activities.

OPERATION PHASE

13.7.2. The potential likely significant effects associated with the operation phase include:

- The change to part of Crossness LNR could reduce levels of enjoyment and the amenity value;
- Effects to arise from the loss of amenity for PRoW users;
- Disturbance to recreational users of the River Thames due to increased operational river traffic; and
- Disturbance to those businesses reliant upon access to the River Thames due to increased operational river traffic.

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

13.7.3. The impacts scoped in or out for the population, human health and land use assessment are as follows:

Table 13-2: Population, Human Health and Land Use – Impacts Scoped In or Out of Further Assessment

Impacts	Phase	Scoped In	Scoped Out	Justification
Terrestrial Businesses	Construction	✓		There is potential during construction that access to businesses may be affected by construction traffic. There is potential for long term construction effects on Munster Joinery Warehouse, which, although would be relocated (as appropriate), for the purposes of a worst-case assessment, could be lost.
	Operation		✓	Once operational, the Proposed Scheme is not anticipated to result in any impacts to nearby businesses, given its nature.
Walkers and Cyclists	Construction	✓		The users of the England Coast Path, Source to Sea National Trail and NCN Route 1 and other PRoWs are likely to be temporarily affected during construction as a result of reduced amenity along the routes. It is anticipated that footpath FP2 would be permanently diverted, which could adversely affect users, particularly those using the route to access Norman Road, Crossness LNR or the English Coast Path.
	Operation	✓		There is potential for a loss in amenity of those footpaths in close proximity to the Proposed Scheme which could adversely affect users and their enjoyment of the routes.
Terrestrial Recreation	Construction	✓		There is potential for the disruption to access, loss of amenity and permanent change to part of the Crossness LNR. There is also potential for the adjacent informal green space to be disrupted during construction. Parking for visitors to Crossness LNR uses on street

Impacts	Phase	Scoped In	Scoped Out	Justification
				parking along Norman Road on an informal basis, which is located within the Site Boundary and provides access to the Proposed Scheme.
	Operation	✓		**Chapter 6: Terrestrial Biodiversity**, outlines the potential for habitat loss at Crossness LNR. Loss of wildlife (particularly birds) could generate a permanent, long-term impact on the nature reserve and its users. This, along with the operational Proposed Scheme, could reduce levels of enjoyment and the amenity value of the site and impact overall visitor numbers. Further assessment work is required in relation to habitat loss and the potential impact on Crossness LNR, and this has therefore remained scoped in.
Community Land and Assets	Construction		✓	There are limited community land uses and assets located within the Study Area. Access to these facilities is likely to be maintained throughout construction therefore, effects are expected to be minimal.
	Operation		✓	Once operational, the Proposed Scheme is unlikely to have any effect on community land and assets.
Private Property and Housing	Construction		✓	Due to the limited number of private property and housing located within the Study Area, the contained nature of the construction works and the surrounding road network with good road linkages, it is anticipated that effects on access will be minor.

Impacts	Phase	Scoped In	Scoped Out	Justification
				Due to its location within an existing industrial area, the gypsy and traveller site located on Jenningtree Way is unlikely to be significantly affected by the Proposed Scheme.
	Operation		✓	Due to the nature of the Proposed Scheme, once operational it is likely to have a significant effect on private property and housing.
Business that rely upon access to the River Thames	Construction	✓		It is expected that the construction of the Proposed Scheme would not impede on businesses that rely on the river for the transportation of materials and goods. During the construction period, it is assumed that marine vessels would be able to use the river for transportation without impediment. However, as detailed in **Chapter 18: Marine Navigation** of this Scoping Report, further assessment work is required in relation to marine vessel navigation and traffic and therefore, this has remained scoped in.
	Operation	✓		During operation, it is assumed that marine vessels would be able to use the river for transportation without impediment. However, as detailed in **Chapter 18: Marine Navigation** of this Scoping Report, further assessment work is required in relation to marine vessel navigation and traffic and therefore, this has remained scoped in.
Recreational users of the River Thames	Construction	✓		The Proposed Scheme is located within the Belvedere Industrial Area so the construction works would not significantly decrease the enjoyment of recreational activities along and within the river. It is understood that access for recreational boats along the River Thames

Impacts	Phase	Scoped In	Scoped Out	Justification
				would not be inhibited during the construction phase. However, as detailed in **Chapter 18: Marine Navigation** of this Scoping Report, further assessment work is required in relation to vessel navigation and traffic and therefore, this has remained scoped in. Angling opportunities along the River Thames may be affected by the construction of the Proposed Development. As stated in **Chapter 7 – Marine Biodiversity**, there is potential for loss of subtidal and intertidal habitat, changes to habitat quality and disturbance to migratory species, which may adversely affect fish populations and subsequently the overall experience for anglers.
	Operation	✓		During operation, it is assumed that marine vessels would be able to use the river for transportation without impediment. However, as detailed in **Chapter 18: Marine Navigation** of this Scoping Report, further assessment work is required in relation to marine vessel navigation and traffic and therefore, this has remained scoped in.

Impacts	Phase	Scoped In	Scoped Out	Justification
Human Health	Construction Operation		✓	There is potential for direct adverse and beneficial effects on human health, however, any human health effects from **Chapter 4: Air Quality, Chapter 5: Noise and Vibration, Chapter 9: Townscape and Visual, Chapter 14: Socio-economics** and **Chapter 17: Landside Transport** will be assessed within those ES chapters. Although scoped out, the PEIR and ES for the Proposed Scheme will include an additional appendix to cross-reference where the ES has considered health within these chapters.

13.8. PROPOSED ASSESSMENT METHODOLOGY

13.8.1. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with LBB and the EA.

13.8.2. The assessment will be qualitative and informed by desk based study. A conditions survey will be undertaken for PRoW immediately surrounding the Site, in particular FP2 and the green space to the west and south of the Site Boundary. In addition, LBB the London Borough of Bexley will be consulted to ascertain PRoW usage data for the PRoW in the Study Area. If this data is not deemed adequate for the assessment, PRoW usage surveys will be undertaken for the PRoW in the immediate vicinity of the Site Boundary.

13.8.3. Based on the likely effects set out above, professional judgement and experience on similar projects, the scope of the assessment will include the following:

- access to businesses to be temporarily disrupted during construction due to the increases in construction traffic;
- potential loss of businesses;
- disturbances to those businesses reliant upon access to the River Thames during construction;
- disruption and possible diversions to PRoW, long distance walking routes and NCN routes during construction; and
- disruption to recreational facilities and activities (including users of the River Thames) during construction and loss of amenity during operation.

SIGNIFICANCE CRITERIA

13.8.4. The significance level attributed to each effect will be assessed based on the sensitivity of the affected receptor(s) and the magnitude of change arising from the Proposed Scheme, in accordance with the methodology outlined in **Chapter 3: EIA Methodology**.

13.8.5. The sensitivity criteria is detailed in **Table 13-3** below.

Table 13-3: Population, Human Health and Land Use 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); and

Sensitivity	Criteria
	• Recreational activities/facilities (including informal green space) 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); and • Recreational activities/facilities (including informal green space) that are of regional status and or medium visitor numbers.
Low	• Proposed development on unallocated sites providing employment with planning permission/in the planning process; • Recreational activities/facilities (including informal green space) that are of local status and / or low visitor numbers; and • Locally designated PRoW and other routes close to communities which are used mainly for recreational purposes (for example dog walking), but for which alternative routes can be taken.
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; and • Recreational activities/facilities (including informal green space) that have very low visitor numbers.

13.8.6. The magnitude of change shall be reported in line with the criteria outlined in **Table 13-4** below.

Table 13-4: Population, Human Health and Land Use Magnitude of Impact Criteria

Magnitude of Impact	Criteria
Major	**Businesses and recreation:** 1) loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements, e.g. direct acquisition and demolition of buildings and direct development of land to accommodate the Proposed Scheme; and / or

Magnitude of Impact	Criteria
	2) 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.
Moderate	**Businesses and recreation:** 1) partial loss of/damage to key characteristics, features or elements, e.g. partial removal or substantial amendment to access or acquisition of land compromising viability of businesses, recreation asset; and/or 2) 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.
Minor	**Businesses and recreation:** 1) a discernible change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, 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; and/or 2) 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.
Negligible	**Businesses and recreation:** 1) very minor loss or detrimental alteration to one or more characteristics, features or elements, e.g. acquisition of non-operational land or waterways/buildings not directly affecting the viability of businesses, recreation asset; and/or

Magnitude of Impact	Criteria
	2) very minor introduction (adverse) or removal (beneficial) of severance with ample accessibility provision. **Walkers and cyclists:** No change to recreational or commuting route/resource used by walkers and cyclists.
No Change	No loss or alteration of characteristics, features, elements or accessibility; no observable impact in either direction.

13.8.7. The overall significance of effects will be determined based on the matrix shown in **Chapter 3: EIA Methodology**. Effects that are classified as moderate or above are considered to be significant. Effects classified as minor or below are considered to be not significant.

13.9. ASSESSMENT LIMITATIONS AND ASSUMPTIONS

13.9.1. The following limitations and assumptions have been identified:

- This chapter relies on, in part, 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.

13.10. REFERENCES

Ref 13.1: Department of Energy and Climate Change. (2011). 'National Policy Statement for Energy EN-1'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 13.2: Department for Business, Energy and Industrial Strategy. (2021). 'Draft Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf

Ref 13.3: Ministry of Housing, Communities and Local Government. (2021). 'National Planning Policy Framework'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf

Ref 13.4: Mayor of London. (2021). 'The London Plan'. Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

Ref 13.5: London Borough of Bexley. (2012). 'Core Strategy 2012'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Core-Strategy.pdf

Ref 13.6: London Borough of Bexley. (2004). 'Unitary Development Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-12/Bexley-unitary-development-plan-written-statement-2004.pdf

Ref 13.7: London Borough of Bexley. (2022). 'Draft Local Plan'. Available at: https://www.bexley.gov.uk/services/planning-and-building-control/planning-policy/local-plan-review

Ref 13.8: The Marine Management Organisation. (2021). 'Southeast Inshore Marine Plan'. Available at: https://www.gov.uk/government/organisations/marine-management-organisation

Ref 13.9: London Borough of Bexley. (2008). 'Open Space Strategy'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/LDF-Bexley-Open-Space-Strategy_0.pdf

Ref 13.10: UK Government. 'Countryside and Rights of Way Act'. (2000). Available at: https://www.legislation.gov.uk/ukpga/2000/37/contents

Ref 13.11: UK Government. 'Equality Act'. (2010). Available at: https://www.legislation.gov.uk/ukpga/2010/15/contents

Ref 13.12: UK Government. 'Localism Act'. (2011). Available at: https://www.legislation.gov.uk/ukpga/2011/20/contents

Ref 13.13: Ministry of Housing, Communities and Local Government and Department for Levelling Up, Housing and Communities. (2021). 'Planning Practice Guidance'. Available at: https://www.gov.uk/government/collections/planning-practice-guidance

Ref 13.14: Department for Levelling Up, Housing and Communities and Ministry of Housing. (2014). 'Communities and Local Government, Planning Practice Guidance - Open space, sports and recreation facilities, public rights of way and local green space'. Available at: https://www.gov.uk/guidance/open-space-sports-and-recreation-facilities-public-rights-of-way-and-local-green-space

Ref 13.15: Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government. (2014). 'National Planning Practice Guidance, Healthy and Safe Communities'. Available at: https://www.gov.uk/guidance/health-and-wellbeing

Ref 13.16: London Borough of Bexley. (2019). 'Connected Communities 2019 – 2023'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-10/connected-communities-strategy-2019-to-2023.pdf

Ref 13.17: Office for Health Improvements and Disparities. 'Fingertips Public Health Data, Public Health Profiles'. Available at: https://fingertips.phe.org.uk/

Ref 13.18: Ministry of Housing. 'Communities and Local Government, (2019) English indices of deprivation'. Available at: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019

Ref 13.19: London Borough of Bexley. 'Joint Strategic Needs Assessment'. Available at: https://bexleyjsna.co.uk/

Ref 13.20: Mayor of London. 'London Datastore, London Area Profiles'. Available at: https://data.london.gov.uk/london-area-profiles/

Ref 13.21: Office for National Statistics. 'Nomis Labour Market Profiles'. Available at: https://www.nomisweb.co.uk/reports/lmp/la/1946157262/report.aspx?town=bexley

Ref 13.22: Marine Services. 'Marine Management Organisation Marine Activity Data'. Available at: https://explore-marine-plans.marineservices.org.uk/

Ref 13.23: London Borough of Bexley. (2021). 'Gypsy and Traveller and Travelling Showperson Accommodation Assessment, 2021'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-12/SD7-gypsy-and-traveller-accomodation-assessment.pdf

Ref 13.24: National Trails. 'Thames Path'. Available at: https://www.nationaltrail.co.uk/en_GB/trails/thames-path/

Ref 13.25: London Borough of Bexley. 'Public Rights of Way Map'. Available at: https://bexleycouncil.maps.arcgis.com/apps/webappviewer/index.html?id=21c7b3240e53496ab9ef46632ba84d26

14. SOCIO-ECONIMICS

14.1. INTRODUCTION

14.1.1. This chapter considers the impacts of the Proposed Scheme on socio-economics during construction and operation, and any potential significant effects. It identifies those impacts that can be scoped out of the assessment.

14.2. POLICY, LEGISLATION, AND GUIDANCE

14.2.1. The policy and guidance relevant to the assessment of the Proposed Scheme is as stated in **Table 14-1**. There is no legislation that is directly relevant to the assessment.

Table 14-1: Socio-economics – Summary of Key Policy, Legislation and Guidance

Policy / Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011 (Ref 14.1)	Sets out the Government's national policy for the delivery of major energy infrastructure and will be the primary basis for decision making. Section 5.12 Socio-economic 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 and assessment of these impacts as part of the Environmental Statement".*
Draft Overarching National Policy Statement for Energy (EN-1) 2021 (Ref 14.2)	The Government has published a draft update to the Overarching National Policy Statement for Energy. Section 5.13.2 Socio-economic 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."*
National Planning Policy Framework (NPPF) 2021 (Ref 14.3)	Presents the Government's planning policies for England and how these are expected to be applied. Noise is referenced within the document as follows: "*82a… set out a clear economic vision and strategy which positively and*

Policy / Guidance	Description
	proactively encourages sustainable economic growth."
The London Plan 2021 (Ref 14.4)	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 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 SIL should "*be managed proactively through a plan-led process to sustain them as London's largest concentrations of 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.
London Borough of Bexley Core Strategy 2012 (Ref 14.5)	The Core Strategy sets out the Council's long-term vision for development in the borough. It aims to support a strong, sustainable and

Policy / Guidance	Description
	cohesive community. Policy CS12: Bexley's Future Economic Contribution states that the council will promote sustained economic and employment development.
London Borough of Bexley Unitary Development Plan 2004 – 'Saved' Policies (Ref. 14.6)	The main purpose of the Unitary Development Plan is to provide a framework for guiding development, and to show how land will be used as a resource for achieving the Council's wider objectives. Although this plan has been replaced by the Core Strategy a number of policies have remained as 'saved' policies. Those of relevance to socio-economics include: • G14: Employment locations and requirements; and • G24: Industrial and business growth. It should be noted that these 'saved' policies in Bexley's UDP will be replaced (either in full or in part) by policies set out in the forthcoming Local Plan documents.
London Borough of Bexley Draft Local Plan 2021 (Ref 14.7)	The new Local Plan is awaiting adoption and will then replace the Bexley Core Strategy and Saved UDP policies 2012. Policy SP3: Employment Growth, Innovation and Enterprise states that the council will promote sustained development and employment growth and ensure residents of all abilities are provided with opportunities to access a variety of local jobs. It also states that the designated SIL will be protected for industrial type activities and related functions.
Southeast Inshore Marine Plan 2021 (Ref 14.8)	The Southeast Inshore Marine Plan area stretches from Felixstowe in Suffolk to west of Dover in Kent and incorporates the River Thames. The Southeast Marine Plan will help to enhance and protect the marine environment and achieve sustainable economic growth while

Policy / Guidance	Description
	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) (Ref. 4.9)	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.
Employment Density Guide 3rd Edition 2015 (Ref 14.10)	Provides an employment density matrix for the different use classes, as a guide for future employment assessment.
Additionality Guide 4th Edition 2014 (Ref 14.11)	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.

14.3. BASELINE CONDITIONS AND FUTURE BASELINE

14.3.1. The key sources of information on baseline socio-economic conditions will be:

- Ordnance Survey Mapping (**Ref 14.12**);
- Port of London Authority (**Ref 14.13**);
- NOMIS Labour Market Profiles (**Ref 14.14**);
- United Kingdom Metropolitan Police Service (**Ref 14.15** and **Ref 14.16**); and
- Office for National Statistics (ONS) (**Ref 14.17**).

14.3.2. The information gathered and presented within the ES for Riverside 2 will inform the baseline relevant to socio-economics, where relevant.

14.3.3. A short summary of baseline conditions is presented below.

BASELINE CONDITIONS

Economy and Employment

14.3.4. According to NOMIS[17] data (**Ref 14.14**), the proportion of individuals aged 16-64 estimated to be economically active in 2021 was 84.0% (136,600 people) in Bexley, which is higher when compared with the London (79.4%) and Great Britain (78.4%) averages.

14.3.5. In Bexley, there were 74,000 jobs in 2021, 64.9% of which were full-time and 36.5% part-time. In 2021, the job density levels (i.e. the ratio of total jobs to the population aged 16-64) was 0.55 in Bexley, which was much lower than the London (1.02) and Great Britain (0.86) averages.

14.3.6. **Table 14-2** details the employee jobs per industry sector in 2021. The highest proportion of employee jobs were in Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles sector (Sector G) at 18.9%. This reflects the position across London and Great Britain. The proportion of employee jobs in Bexley in the Construction sector (Sector F) was higher (8.1%) than the London (3.5%) and Great Britain (4.9%) averages. Whilst the proportion of employee jobs in the Financial and Insurance Activities sector (Sector K) was lower (0.9%) than the London (8.0%) and Great Britain (3.6%) averages.

Table 14-2: Overview of employee jobs by industry sector in 2021 (Ref 14.14)

Industry sector	Bexley	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

[17] NOMIS is the Office for National Statistics web-based database of census and labour market statistics.

Industry sector	Bexley	London	Great Britain
	%		
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

Accommodation and Community Infrastructure Provision

14.3.7. There are approximately 15 short term accommodations within 3km of the Site Boundary (**Ref. 14.12**). There are also approximately 30 primary schools, four secondary schools, one hospital, ten GP practices and ten dentists located within 3km of the Site Boundary (**Ref. 14.12**).

14.3.8. As set out in **Chapter 13: Population and Human Health** of this Scoping Report, there are also a number of community and recreational resources as well as public rights of way (PRoW) within the vicinity of the Proposed Scheme, in particular:

- Crossness LNR is partially located within the Site Boundary, which includes bird hides, informal trails and paddocks for horses;
- An area of grassed, green space immediately west and south of the Site Boundary;
- The Engine House, co-working community space which is located approximately 400m south of the Site Boundary;
- Snap Fitness Gym which is situated approximately 350m southeast of the Site Boundary; and
- A number of PRoW and recreational routes located within and surrounding the Site Boundary, including the England Coast Path / Source to Sea National Trail and National Cycle Network (NCN) Route 1, FP2, FP3 and FP4.

14.3.9. The Proposed Scheme is well connected with good public transport and road networks linkages; Belvedere train station is located approximately 620m south of the Site Boundary. This means construction workers could reside within another area in London and travel to Site.

Commercial Businesses

14.3.10. **Chapter 2: Site and Proposed Scheme Description** and **Chapter 13: Population, Health and Land Use** provides an overview of the commercial businesses (terrestrial and marine) located within, and in the area surrounding, the Site Boundary.

14.3.11. Of specific relevance to this chapter is Munster Joinery Warehouse, located within the Site Boundary. Munster Joinery is a manufacturing company with over 1,700 employees of which 700 are based in the UK. The Munster Joinery Warehouse within the Site Boundary is used for storage and the co-ordination of deliveries (**Ref 14.18)** with the company's main UK employment site in Wellesbourne, Warwickshire**.**

14.3.12. The Bexley Riverside Opportunity Area has been allocated within the London Plan since 2004 with the potential for provision of 6,000 new homes and 19,000 new jobs by 2041 (**Ref 14.4**). The detailed boundary of the Opportunity Area has not been defined at the time of writing. However, it is likely to fall within the Study Area as detailed in the London Plan 2021 **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 (**Ref 14.4**).

14.3.13. The accessibility and viability of commercial businesses has been reported in **Chapter 13: Population, Health and Land Use** and will not be considered further within this chapter.

Crime and Safety

14.3.14. In Belvedere (**Ref 14.15**) and Thamesmead East (**Ref 14.16**) where the Proposed Scheme is located, the highest proportion of crimes were violent offences and anti-

social behaviour. When combined, violent offences and anti-social behaviour crimes accounted for approximately 48.4% and 51.7% respectively of the total crimes within the areas between December 2021 to November 2022.

14.3.15. Accordingly to the ONS (**Ref. 14.17**), the total number of crimes recorded by the Metropolitan Police for Greater London (where the Proposed Scheme is located) between October 2021 and September 2022 was 862,065, of which 'Theft offences' made up the highest number of all recorded crimes (45.2%). This is significantly higher than the England and Wales (29.6%) averages.

FUTURE BASELINE

14.3.16. Existing commercial business within the Site Boundary would remain at their current locations should the Proposed Scheme not proceed. These include Riverside 1 (including the Middleton Jetty) and the Munster Joinery Warehouse. Riverside 2 would also be operational in the future baseline (at the time of writing, construction works for Riverside 2 are being undertaken).

14.3.17. Bexley Riverside Opportunity Area is likely to bring additional housing and employment opportunities in Bexley. It is anticipated that there would be changes to the distribution and structure of the population over time. However, overall, the economy and level of crime in Bexley and London are unlikely to change significantly should the Proposed Scheme not proceed.

14.4. STUDY AREA

14.4.1. In the absence of statutory guidance on socio-economics assessment, reference has been made to best practice guidance and professional judgement. The Study Area for employment generation follows guidance set out within the Employment Density Guide 3rd Edition (**Ref 14.10**) and Additionality Guide 4th Edition (**Ref 14.11**)[18].

ECONOMY AND EMPLOYMENT

14.4.2. The Study Area for socio-economics covers the area of economic impact of the Proposed Scheme. The Proposed Scheme is accessible from Bexley, as well as areas of Greater London and is likely to be operated by a labour force from across these areas. Consequently, the local Study Area for socio-economics is Bexley and the regional Study Area comprises Greater London.

14.4.3. The Study Area for commercial businesses (terrestrial and marine) are those located within the Site Boundary or with direct access within the Site Boundary because these are the businesses that would most likely be positively or negatively affected by the Proposed Scheme.

[18] Whilst both of the guidance documents were withdrawn in 2022 due to the Homes and Communities Agency being replaced by Homes England, no statement on replacement guides published by the United Kingdom Government has been made, where both guidance documents 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.

CRIME AND SAFETY

14.4.4. Baseline data has been sourced from the ONS (**Ref. 14.17**) to show existing crime levels surrounding the Proposed Scheme. The Study Area is based upon the area of the Metropolitan Police, where the Proposed Scheme is located.

14.5. SENSITIVE RECEPTORS / RESOURCES

14.5.1. 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 that may provide services or accommodation, either through supply chain linkages or accommodation to construction employees; and
- An individual or community's experience of crime and safety.

14.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION PHASE

14.6.1. Relevant design, mitigation and enhancement measures will be identified in the ES. These are likely to include:

- the Applicant would seek to relocate the existing Munster Joinery warehouse; and
- the Applicant would recruit locally wherever practicable.

OPERATION PHASE

14.6.2. Relevant design, mitigation and enhancement measures will be identified in the ES. These are likely to include:

- the Applicant has a strong preference to recruit locally wherever practicable and to enable access to training and career development;
- the processes used to recruit and manage staff to work at the Proposed Scheme would be demonstrably fair and offer equal opportunities to all; and
- the Applicant would continue to provide community funding to support activities to improve the local community in Bexley.

14.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

14.7.1. The potential effects associated with the construction phase include:

- potential generation of direct, indirect and induced[19] employment opportunities;
- potential generation of Gross Value Added (GVA);

[19] Induced employment is the generation of further employment from part of the construction workers' and suppliers' income that is spent in the area local to the Proposed Scheme (e.g. cafes, shops and restaurants).

- the generation of employment opportunities and GVA could potentially support government policies;
- potential increased demand for accommodation and community facilities due to an influx of construction workers; and
- potential changes in site security and safety levels within and around the Site Boundary.

OPERATION PHASE

14.7.2. The potential effects associated with the operation phase include:

- potential generation of direct, indirect and induced employment opportunities;
- potential generation of GVA;
- the generation of employment opportunities and GVA could potentially support government policies; and
- potential changes in site security and safety levels around the Site Boundary.

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

14.7.3. The impacts scoped in or out for the socio-economics assessment are as follows:

Table 14-3: Socio-economics - Scoped In or Out of Further Assessment

Impacts	Phase	Scoped In	Scoped Out	Justification
Employment Generation (direct, indirect and induced) and GVA	Construction	✓		Construction of the Proposed Scheme is anticipated to generate temporary employment opportunities and GVA, directly from construction workers on site throughout the construction period; indirectly through manufacturing services and suppliers of the construction process; and by construction workers spending part of their income in the area local to the Site. This would benefit the residents of Bexley and Greater London. Therefore, this has been scoped into the Environmental Statement (ES).
Employment Generation (direct, indirect and induced) and GVA	Operation	✓		The Proposed Scheme is anticipated to generate permanent employment opportunities and GVA, directly from employment on site; indirect employment through manufacturing services and suppliers for maintenance activities; and induced employment by income of the employees to be spent in the local area. This would generate further employment in Bexley and Greater London. As a worst-case scenario if relocation efforts were not successful, Munster Joinery Warehouse (located within the Site Boundary) would be lost with the existing employment opportunities associated with Munster Joinery Warehouse also being lost. Therefore, operational employment generation and GVA have been scoped into the ES.

Impacts	Phase	Scoped In	Scoped Out	Justification
Increased Demand for Accommodation and Community Facilities due to an Influx of Workers	Construction		✓	There is a good level of short-term accommodation and social infrastructure (e.g. schools, GP practices and dentists) within 3km of the Site Boundary. There are also community and recreational resources located in the vicinity of the Proposed Scheme. The Proposed Scheme is well connected with good public transport and road networks linkages; with Belvedere train station being located approximately 620m south of the Site Boundary. This means construction workers could reside within another area in London and travel to Site. Due to the nature of the scheme and construction methodology that will be adopted (e.g. using prefabricated materials as much as practicable), it is anticipated that the use of specialised contractors would be limited and the majority of the workforce will be from the local and regional area. Given the facilities in the vicinity of the Site, good transport linkages and workforce to be utilised, it is anticipated that there would not be a significant increase in demand for accommodation, social infrastructure such as community and recreational resources from construction workers relocating close to the Proposed Scheme.
Crime and Safety	Construction		✓	It is assumed that site security arrangements for the Proposed Scheme will be in line with the requirements set out the Construction (Design and Management) Regulations where appropriate levels of security (staff / CCTV) will be appointed, and fencing will be in place during the construction phase.

Impacts	Phase	Scoped In	Scoped Out	Justification
				Advance notice regarding construction activities in the River Thames is anticipated to be provided to the Port of London Authority prior to the commencement of construction. Therefore, there is unlikely to be a significant effect in relation to crime and safety during construction.
Crime and Safety	Operation		✓	It is anticipated that the Proposed Scheme as part of the design of the Proposed Scheme liaison is likely to be undertaken with the Metropolitan Police Liaison Officer and Port of London Authority. Appropriate levels of security (staff / CCTV) will be implemented during the operational phase. These include controlled entry automated gate car park access barrier, lighting, and fencing and repairment. Therefore, there is unlikely to be a significant effect in relation to crime and safety during operation.

14.8. PROPOSED ASSESSMENT METHODOLOGY

14.8.1. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with LBB and the EA.

14.8.2. A review of local, regional and national socio-economic planning policies and strategies will be undertaken and considered as part of the ES. A desktop review will also be undertaken which will consider population as well as economy and employment.

14.8.3. The assessment methodology for the generation of employment and GVA will be based on Homes and Communities Agency (now known as Homes England) Employment Density Guide 3rd Edition (**Ref 14.10**) and English Partnerships Additionality Guide 4th Edition (**Ref 14.11**)[20].

14.8.4. Socio-economics effects will be assessed for both the construction and operation phases of the Proposed Scheme.

CONSTRUCTION EMPLOYMENT AND GVA

14.8.5. The gross employment generated by the temporary construction phase will be estimated by applying an average gross output per construction industry employee from 2019[21] to the estimated total construction cost. Leakage, displacement, and multiplier effects are then taken into account to determine the total net employment.

Leakage

14.8.6. Leakage effects are the "*proportion of outputs that benefit those outside of the intervention's target area or group*". The English Partnerships Additionality Guidance (**Ref 14.11**) provides guidance on the level of leakage. Due to the location of the Proposed Scheme, a medium level of leakage (25%) has been deemed appropriate for the assessment. This implies a reasonably high proportion of employment opportunities would go to people living within the target (effect) area.

Displacement

14.8.7. Displacement measures the extent to which the benefits of a project are offset by reduction of output or employment elsewhere. 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.

[20] Whilst Homes and Community Agency (HCA) (now known as Homes England) Employment Density Guide 3rd Edition and English Partnerships Additionality Guidance have been withdrawn in 2022, due to the HCA being replaced by Homes England, no statement on replacement guides published by the United Kingdom Government has been made and both guidance 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.

[21] 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.

14.8.8. Construction workers typically move between construction projects in Greater London when delays occur or to help the workforce meet particular 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.

14.8.9. The English Partnerships Additionality Guidance (**Ref 14.11**) 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.*"

Multiplier Effects

14.8.10. 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*" (**Ref 14.11**); 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).

14.8.11. 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 English Partnerships Additionality Guidance (**Ref 14.11**) 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, within a Greater London context, a 'high' multiplier of 1.7 will be applied.

GVA

14.8.12. 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 per construction worker will be estimated using accepted guidance from the Office for National Statistics (**Ref 14.19**).

OPERATIONAL EMPLOYMENT AND GVA

14.8.13. Applying Homes and Communities Agency (now known as Homes England) Employment Densities Guidance (**Ref 14.10**) to the employment generating floorspace within the Proposed Scheme will provide an estimate of the total gross jobs on-site. To determine the net operational employment, the net 'deadweight' on-site relating to the existing warehouse use is discounted from the gross impact and a leakage rate of 25%, a low level of displacement of 25%, and a 1.7 multiplier (as per English Partnerships Guidance on leakage, displacement, and multipliers) (**Ref 14.11**). GVA per operational phase workers will be estimated using accepted guidance from the Office for National Statistics (**Ref 14.19**).

SIGNIFICANCE CRITERIA

14.8.14. The socio-economic assessment seeks to establish the potential socio-economic 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 English Partnerships Additionality Guidance (**Ref 14.11**).

14.8.15. The sensitivity of receptors will be 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

14.8.16. For socio-economics, there is no accepted definition of what constitutes a significant (or not significant) socio-economic 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.

14.8.17. As such effects will be 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; however, the assessment instead takes account of the qualitative (rather than quantitative) 'sensitivity' of each receptor and, in particular, on their ability to respond to change.
- Magnitude of impact – this entails consideration of the size of the impact on people or business in the context of the area in which the effects would be experienced.
- Scope for adjustment or mitigation – this assessment is concerned in part with economies which 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.

14.8.18. The significance level attributed to each effect will be assessed based on the sensitivity of the affected receptor(s) and the magnitude of change arising from the Proposed Scheme, in accordance with the methodology outlined **in Chapter 3: EIA Methodology**.

14.8.19. 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 will be defined as follows:

- **Positive**: classifications of significance indicate an advantageous or beneficial effect on an effect area, which may be minor, moderate, or major in effect;
- **Negative**: 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.

14.8.20. Based on consideration of the above, where an effect is assessed as being positive or negative, the significance level attributed to each effect will be assessed based on the sensitivity of the affected receptor(s) and the magnitude of change arising from the Proposed Scheme, in accordance with the methodology outlined **in Chapter 3: EIA Methodology**. Significance will be assigned using the scale below based on professional judgement:

- **Negligible**: No receptors (or very few) are positively or negatively affected. No discernible improvement or deterioration to the existing environment as a result 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.

14.8.21. The duration of effect is also considered, with more weight given to permanent changes than to temporary ones. Temporary effects will be considered to be those associated with construction works, and may be short, medium or long term. Permanent effects are generally those associated with the completed development, and are expected to be non-reversible.

14.8.22. Effects that are deemed to be significant for the purpose of this assessment are those that are described as being moderate or major positive or negative.

14.9. ASSESSMENT LIMITATIONS AND ASSUMPTIONS

14.9.1. 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.

14.10. REFERENCES

Ref 14.1: Department of Energy and Climate Change. (2011). 'Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 14.2: Department for Business, Energy and Industrial Strategy. (2021). 'Draft Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf

Ref 14.3: Ministry of Housing, Communities and Local Government. (2021). 'National Planning Policy Framework'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf

Ref 14.4: Greater London Authority. (2021). 'The London Plan'. Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

Ref 14.5: London Borough of Bexley. (2012). 'Bexley Core Strategy'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Core-Strategy.pdf

Ref 14.6: London Borough of Bexley Council. (2004). 'Unitary Development Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-12/Bexley-unitary-development-plan-written-statement-2004.pdf

Ref 14.7: London Borough of Bexley. (2021). 'Draft Local Plan – Proposed Submission Document Regulation 19 Stage'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-10/Draft-local-plan-proposed-submission-document-reg-19-may-2021.pdf

Ref 14.8: Marine Management Organisation. (2021). 'Southeast Inshore Marine Plan 2021'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004493/FINAL_South_East_Marine_Plan__1_.pdf

Ref 14.9: Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government. (2021). 'National Planning Practice Guidance, Healthy and Safe Communities'. Available at: https://www.gov.uk/guidance/health-and-wellbeing

Ref 14.10: Homes and Communities Agency (now known as Homes England). (2015). 'Employment Density Guide 3rd Edition'. Available at: https://www.kirklees.gov.uk/beta/planning-policy/pdf/examination/national-evidence/NE48_employment_density_guide_3rd_edition.pdf

Ref 14.11: English Partnerships. (2014). 'Additionality Guide 4th Edition'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/378177/additionality_guide_2014_full.pdf

Ref 14.12: Mayor of London. (2023). 'Ordnance Survey OpenData'.

Ref 14.13: Port of London Authority. (2023). 'Annual Events Calendar 2023 –2024'. Available at: http://www.pla.co.uk/Events

Ref 14.14: Office for National Statistics. (2023). 'NOMIS Labour Market Profile'. Available at: https://www.nomisweb.co.uk/reports/lmp/la/1946157262/report.aspx

Ref 14.15: UK Police. (2023). 'Belvedere'. Available at: https://www.police.uk/pu/your-area/metropolitan-police-service/belvedere/

Ref 14.16: UK Police. (2023). 'Thamesmead East'. Available at: https://www.police.uk/pu/your-area/metropolitan-police-service/thamesmead-east/

Ref 14.17: Office for National Statistics. (2023). ‘Crime in England and Wales: Police Force Area data tables – Table P1’. Available at: https://www.ons.gov.uk/peoplepopulationandcommunity/crimeandjustice/datasets/policeforceareadatatables

Ref 14.18: Munster Joinery. (2023). ‘About Us’. Available at: Windows & Doors | UK | Munster Joinery

Ref 14.19: Office for National Statistics. (2020). Census data.

15. MATERIALS AND WASTE

15.1. INTRODUCTION

15.1.1. This chapter considers the impacts of the Proposed Scheme on materials consumption and waste generation and disposal during construction and operation, and any potential significant effects. It sets out the proposed methodology for the materials consumption and waste generation and disposal assessment and identifies those impacts that can be scoped out of the assessment. Where necessary, further assessment will be presented in the ES.

15.2. POLICY, LEGISLATION, AND GUIDANCE

15.2.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is detailed in **Table 15-1**. The London Borough of Bexley Unitary Development Plan (UDP) 2004 has been excluded from **Table 15-1** due to a lack specific policies regarding materials and waste.

Table 15-1: Materials and Waste – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011 (Ref 15.1)	Sets out the Government's policy for delivery of major energy infrastructure and will be the primary basis for decision making. *Section 5.14: Waste Management* 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 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.
Draft Overarching National Policy Statement for	This emerging document is due to replace the existing NPS EN-1. In *Section 5.15: Resource and Waste Management*, government expectations on hazardous and non-hazardous waste are outlined, which are intended to protect human health and the environment by producing

Policy / Legislation / Guidance	Description
Energy (EN-1) 2021 (Ref 15.2)	less waste and by using it as a resource wherever possible. Applicants should ensure that through construction best practices, material is reused or recycled on site where possible, or sourced from recycled or reused sources, and that low carbon materials, sustainable sources and local suppliers are used.
National Planning Policy Framework (NPPF) 2021 (Ref 15.3)	The NPPF sets out planning policies and how these are expected to be applied and 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 environment by: "*using natural resources prudently"* and *"minimising waste and pollution"*. Specific guidance under this framework (NPPG) provides further information in support of the implementation of waste planning policy (**Ref 15.4**).
The London Plan 2021 (Ref 15.4)	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 SI 7 and SI 8 set objectives to achieve resource conservation, waste reduction, increases in material recovery, reuse and recycling and to promote circular economy outcomes and the achievement of net zero-waste.
London Borough of Bexley Core Strategy 2012 (Ref 15.5)	The Core Strategy sets out commitments to meet the Borough's waste requirements and targets, to work with other boroughs to accelerate sustainable waste management, and to identify and safeguard suitable sites for waste management facilities. In doing so, this policy strives to achieve the spatial waste objectives set out in the London Plan, the Mayor's Municipal Waste Management Strategy, and in the Waste Management Strategy for Bexley.

Policy / Legislation / Guidance	Description
London Borough of Bexley Unitary Development Plan (UDP) 2004 – 'Saved' Policies (Ref 15.6)	The main purpose of the Unitary Development Plan is to provide a framework for guiding development, and to show how land will be used as a resource for achieving the Council's wider objectives. The 'saved' policies of relevance to Materials and Waste include: • Policy MIN1: In considering proposals for the exploration, exploitation and storage of minerals, the Council will seek to ensure that the environment and public amenity and safety are safeguarded. • Policy MIN4: Wherever possible, potentially workable mineral deposits will be safeguarded from surface development that would sterilise the minerals or prejudice their working. Where development is proposed the Council will consider the prior excavation of the mineral, subject to Policy MIN1. • Policy MIN8: The Council will encourage the efficient use of minerals, including the use of recycled materials.
London Borough of Bexley Draft Local Plan 2021 (Ref 15.7)	The new Local Plan is awaiting adoption and will then replace the Bexley Core Strategy and Saved UDP policies 2012. Policy SP12: Sustainable waste management identifies that new developments will ensure that waste is manged to follow the principles of the circular economy applying the waste hierarchy. Policy DP27: Minerals and aggregates sets out the importance of minerals and aggregates as a non-renewable resource. Mineral sterilisation will be managed through safeguarded areas. The policy also requires maximising the reuse and recycling of construction, demolition and excavation materials on all developments.
Waste Management Plan for England 2021 (Ref 15.8)	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

Policy / Legislation / Guidance	Description
	reuse, recycling, other types of recovery and finally disposal (e.g. landfill).
National Planning Policy for Waste 2014 (Ref 15.9)	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 National Planning Policy Framework; the National Waste Management Plan for England and any relevant successor policies, guidance or documents.
Our Waste, Our Resources: A Strategy for England 2018 (Ref 15.10)	Sets out how the 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 (Ref 15.11)	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 (Ref 15.12)	By 2025, Bexley will have achieved sustainable growth including the preservation of the environmental character of the Borough. A key theme (Theme 7 – Waste Minimisation and Management) outlines aims to manage waste through higher tiers of the waste hierarchy and working alongside other local boroughs to manage waste and share facilities.
Southeast London Joint Waste Planning Technical Paper 2021 (Ref 15.13)	This paper was prepared as evidence to demonstrate that each London boroughs' 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.

Policy / Legislation / Guidance	Description
London Borough of Barking and Dagenham Adopted Core Strategy (2010) (Ref 15.14)	This Strategy is considered relevant due to the Study Area proposed for the assessment (see **Section 15.4**). 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 only as an acceptable last resort.
London Borough of Barking and Dagenham Local Plan (Emerging) 2022 (Ref 15.15)	This forthcoming Local Plan is considered relevant due to the Study Area proposed for the assessment (see **Section 15.4**). This 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.
London Borough of Havering Local Plan 2016-2031 (Ref 15.16)	This Local Plan is considered relevant due to the Study Area proposed for the assessment (see **Section 15.4**). Policy 35 sets out criteria to consider when reviewing planning applications to ensure that 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 (waste prevention) and then maximising the re-use and recycling or composting of waste and minimising the use of landfill, with disposal seen as the final option. Policy 37 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 (Ref 15.17)	The South East 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 refers to the disposal of dredge material, and that any proposals to do so, much demonstrate that they comply with the waste hierarchy.

Policy / Legislation / Guidance	Description
Legislation	
The Revised EU Waste Framework Directive 2008/98/EC (Ref 15.18)	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".*
Environment Act 2021 (Ref 15.19)	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 Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 (Ref 15.20)	Make 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) (Ref 15.21)	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 Controlled Waste (England and Wales) Regulations 2012 (as amended) (Ref 15.22)	Classifies waste as household, industrial or commercial waste. It allows local authorities to implement charges for the collection of waste from non-domestic properties.

Policy / Legislation / Guidance	Description
The Waste (England and Wales) Regulations 2011 (as amended) (Ref 15.23)	Stipulate 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 (Ref 15.24)	Part 5, Chapter 3 of this Act specifically refers to site waste, where there may be a regulatory requirement to prepare Site Waste Management Plans (SWMP) and to ensure compliance with them.
The Hazardous Waste (England and Wales) Regulations 2005 (Ref 15.25)	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 (Ref 15.26)	Enables local planning authorities to take the appropriate steps to reduce and minimise the generation of household, commercial or industrial waste within their area.
The Environmental Protection Act 1990 (Ref 15.27)	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 (Ref 15.28)	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	
National Planning Practice Guidance (2021) (Ref 15.29)	Explains the processes and tools that can be used through the planning system in England.

Policy / Legislation / Guidance	Description
The Institute of Environmental Management and Assessment (IEMA) Guide to Materials and Waste in EIA (Ref 15.30)	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.

15.3. BASELINE CONDITIONS AND FUTURE BASELINE

15.3.1. The key sources of information on material resource availability, landfill capacity and waste recovery will be:

- Department for Business, Energy and Industrial Strategy (2023) Monthly Bulletin of Building Materials and Components (**Ref 15.31**);
- Southeast Aggregates Working Party Annual Report 2018 (2020) (**Ref 15.32**);
- London Aggregates Working Party Annual Report 2019 (**Ref 15.33**);
- Mineral Products Association, Profile of the UK Mineral Products Industry, 2020 Edition (**Ref 15.34**);
- United Kingdom Steel Production I 1969-2020 Data I Historical (Online) (**Ref 15.35**);
- The London Plan (2021) (**Ref 15.4**);
- Natural England MAGIC mapping website (**Ref 15.36**);
- Department for Environment, Food and Rural Affairs (Defra), Basis of the UK BAP target for the reduction in use of peat in horticulture – SP0573 (2009). (**Ref 15.37**);
- Defra (2022) UK Statistics on Waste (**Ref 15.38**);
- Environment Agency, Waste Data Interrogator (2023) Waste Management Information 2021 (**Ref 15.39**); and
- Environment Agency (2023). 2021 Remaining landfill capacity, England (**Ref 15.40**).

15.3.2. A short summary of the baseline conditions is presented below. The baseline conditions presented align with the study areas presented in **Section 15.4**. 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.

15.3.3. The information gathered and presented within the ES for Riverside 2 will inform the baseline relevant to materials and waste, where relevant.

BASELINE CONDITIONS

Construction Material Availability

15.3.4. **Table 15-2** provides a summary of the availability of the main construction materials in London and the Southeast of England (Berkshire, Buckinghamshire, East Sussex, Hampshire, Isle of Wight, Kent, Oxfordshire, Surrey and West Sussex) and the UK (**Ref 15.31, 15.32, 15.33, 15.34** and **15.35**). The overview excludes technological products but provides a context in which the assessment for material consumption during construction from the Proposed Scheme will be undertaken. The data is available for various years from 2018 to 2021, the most recent is presented and dated.

Table 15-2: Construction Materials Availability in London and the Southeast and the UK

Material Type	London and Southeast	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) (Southeast, 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 (2020)
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 Southeast regions).

15.3.5. Further analysis of the data suggests that across the UK, the availability of construction materials typically required for developments in terms of stocks, production or sales remain 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. Further baseline information will be gathered during the production of the PEIR and ES.

15.3.6. Where data are available, London and the Southeast 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 are, however, lower than the UK average, whilst there are no sales from permitted crushed rock facilities for London and the Southeast.

15.3.7. There are no identified Minerals Safeguarding Areas (**Ref 15.12 and 15.13**) and no known peat resources (**Ref 15.36**) or active peat extractions (**Ref 15.37**) within the Site Boundary.

Site Boundary Material and Waste Arisings

Site Arisings Currently Generated

15.3.8. The current land uses within the Site Boundary are expected to generate minimal volumes of material demand and waste arisings, limited to waste and surplus materials generated from the operation and maintenance of: Riverside 1 (including the Middleton Jetty, but not including the residual wastes received for recovery at the facility); the Crossness LNR; the Munster Joinery Warehouse; 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 CD&E baseline from a UK and regional perspective are provided in the following section.

15.3.9. Municipal and operational waste is currently (and will be for Riverside 2) managed by permitted operations at Riverside for the treatment of residual (non-recyclable) waste. 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 Boundary is anticipated to be minimal in the context of regional landfill void capacity. Further information will be presented in the PEIR, if applicable.

CD&E Waste Management: UK and Regional Perspective

15.3.10. Defra data, summarised in **Table 15-3,** shows that, within England, the recovery rate for non-hazardous construction and demolition wastes (excluding excavation wastes) have remained above 90% since 2010 (**Ref 15.38**). 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 waste defined as non-hazardous soils and stones) (**Ref 15.18**).

Table 15-3: 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 (2022) UK Statistics on Waste.
Note: Defra's 2022 update of the data in this table did not extend the data range beyond 2020.

15.3.11. Data in **Figure 15-1** have been collated to show that trends for waste recovery for transfer and materials recovery in London and the Southeast have risen steadily over the past 21 years (**Ref 15.39**). Metal recycling has remained relatively consistent since 2014. Data is provided for all waste types and hence will include, but is not specific to, construction and demolition waste.

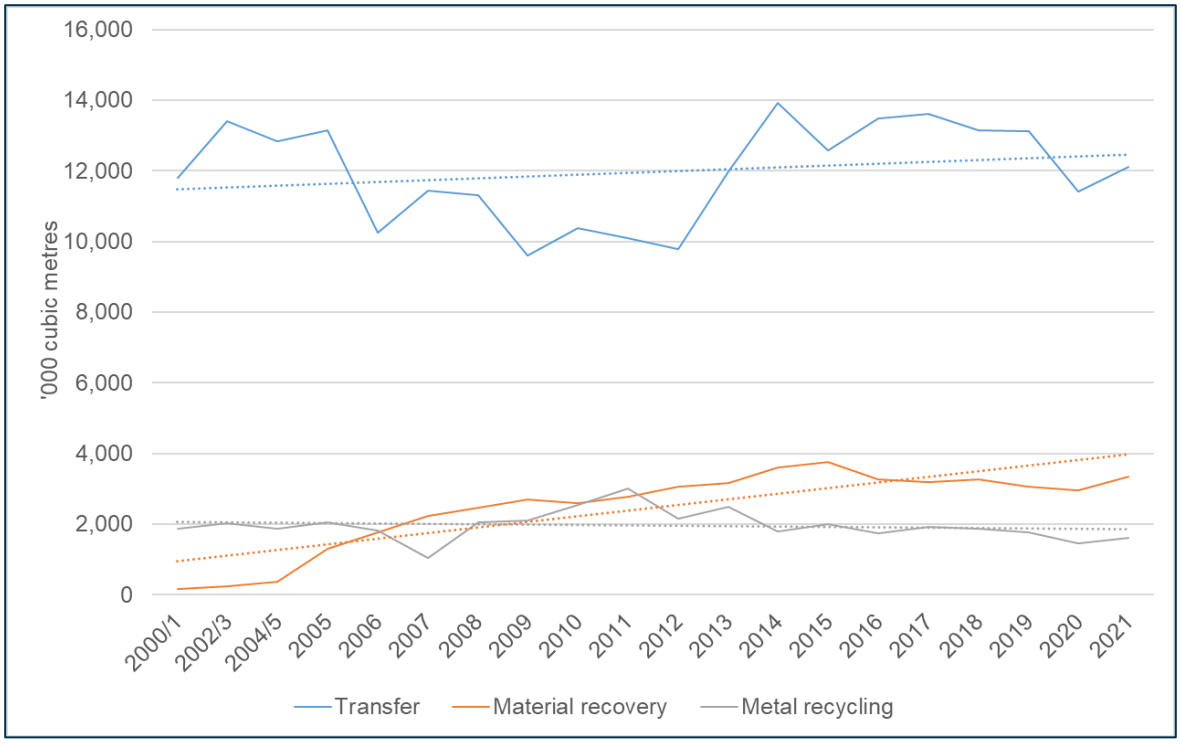


Figure 15-1: Transfer, Materials Recovery and Metal Recycling in London and Southeast (2000/1 – 2021)

15.3.12. Linear trends (shown as dashed lines in **Figure 15-1**) for transfer, recovery and metal recycling in London and the Southeast and the data in **Table 15-4** (**Ref 15.39**) indicate that there is waste management infrastructure available to divert from landfill construction, demolition and excavation wastes from the Proposed Scheme.

Table 15-4: Permitted Waste Recovery Sites in London and Southeast (2021)

Waste Recovery Facility Type	Number of Sites
Incineration	40
Transfer	618
Treatment	633
Metal Recovery	261
Use of Waste	1
Total	**1,553**

15.3.13. Regional data for construction and demolition waste management are presented in **Figures 15-2** and **15-3**. Information has been derived from an analysis of publicly available information in the Waste Data Interrogator (**Ref 15.39**).

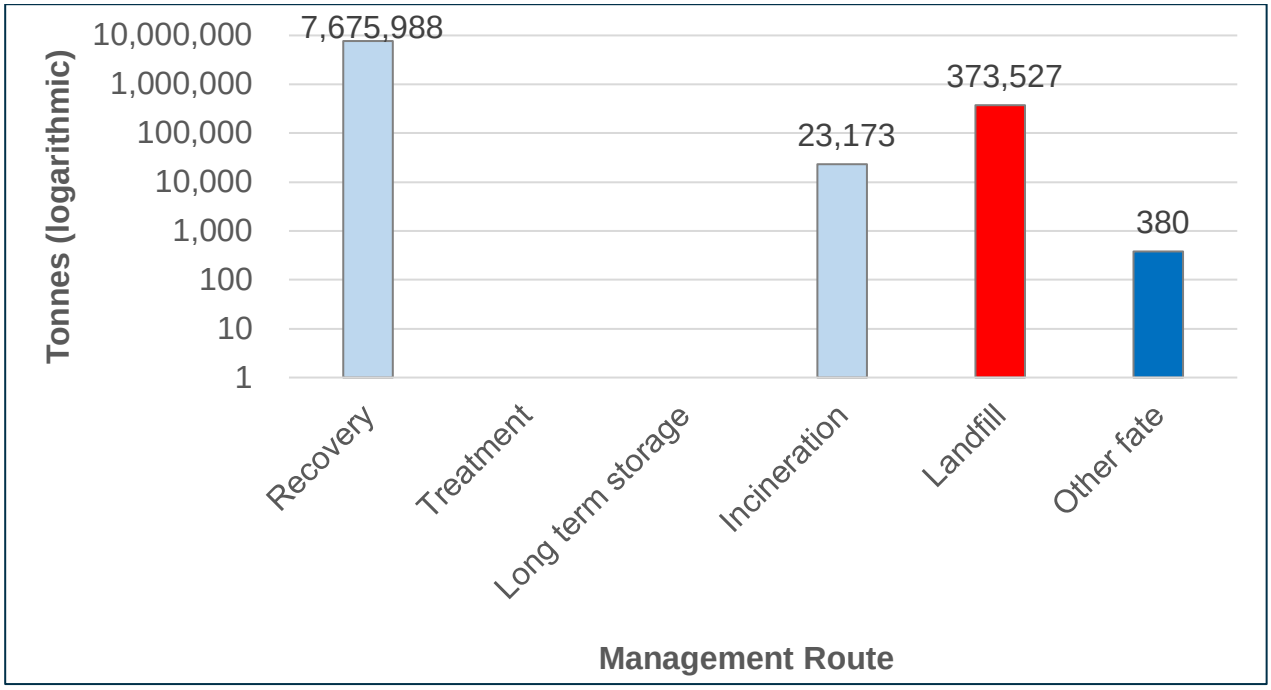


Figure 15-2: London Construction and Demolition Waste Management by Route

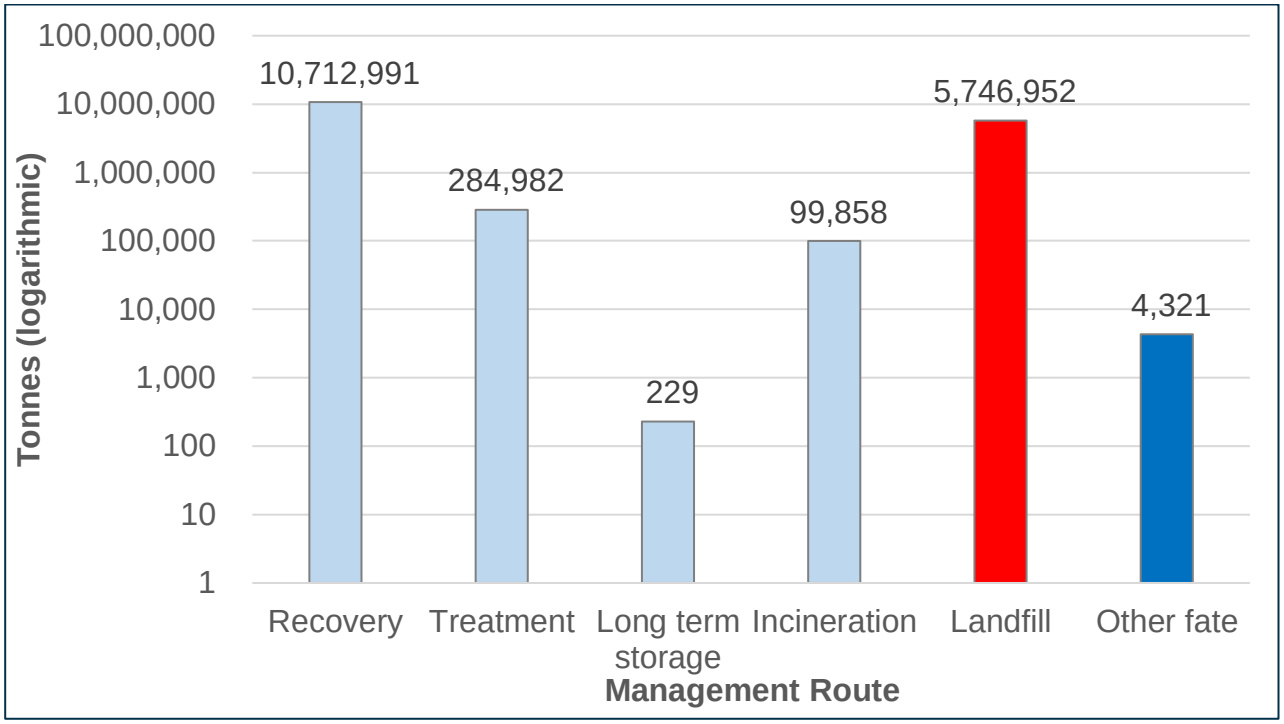


Figure 15-3: Southeast Construction and Demolition Waste Management by Route

15.3.14. Environment Agency data (**Ref 15.39**) in **Figures 15-2** and **15-3** 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 Southeast region recovered waste was more than double the volume of landfilled waste that year.

15.3.15. These findings are supported by data (**Ref 15.39**) provided in **Tables 15-5** and **15-6** which show that, in 2021, 95% (London) and 66% (Southeast) 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 the Southeast regions and from other regions in the UK. Waste generated within the London or the Southeast regions may have travelled into each other for management, or to other regions.

Table 15-5: 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) (**Ref 15.1**).

Non-hazardous waste describes waste that is neither classified as inert nor hazardous.

Table 15-6: Southeast 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%**

15.3.16. The charts and data presented in this section indicate the availability of waste management facilities in the region, that are expected – subject to data provision – to enable suitable recovery of site arisings generated by the Proposed Scheme.

15.3.17. The London Plan (**Ref 15.4**) has set CD&E waste and material recovery targets. These include a target to achieve 95% reuse/recycling/recovery of construction and demolition waste, and 95% beneficial use of excavation waste within the 20-25 year timeframe of the Plan.

15.3.18. The availability of materials recovery infrastructure in London and the Southeast (mindful of the financial and environmental benefits that can be achieved by applying the proximity principle) suggests that there is good potential to divert from landfill site arisings generated by the Proposed Scheme.

Remaining Landfill Capacity

15.3.19. At the end of 2021, 56 landfill sites in London and the Southeast were recorded as having 57Mm^3 of remaining capacity between them; these data are presented in **Table 15-7** (**Ref 15.40**).

Table 15-7: Remaining Landfill Capacity in London and Southeast (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	0.0 (-17.1%)
Hazardous (restricted*)	117,042	98,187	0.0 (-16.1%)
Inert	27,751,909	21,820,265	-5.9 (-21.4%)

Landfill Type	Capacity in 2020 (m^3)	Remaining Capacity in 2021 (m^3)	2020 to 2021 Change in Capacity (Mm^3) and Percentage
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%)**
Notes	*Restricted landfill sites only accept waste from restricted sources and producers, e.g. site operator/managing site.		

15.3.20. The London Plan (**Ref 15.4**) 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 the development.

15.3.21. 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 (**Ref 15.11**).

15.3.22. Baseline regional landfill capacity (**Ref 15.40**) is detailed in **Figure 15-4**. Statistical forecasting has been used to demonstrate long term void beyond the earliest operational date for the Proposed Scheme (see **Chapter 2: Site and Proposed Scheme Description** for the construction phase).

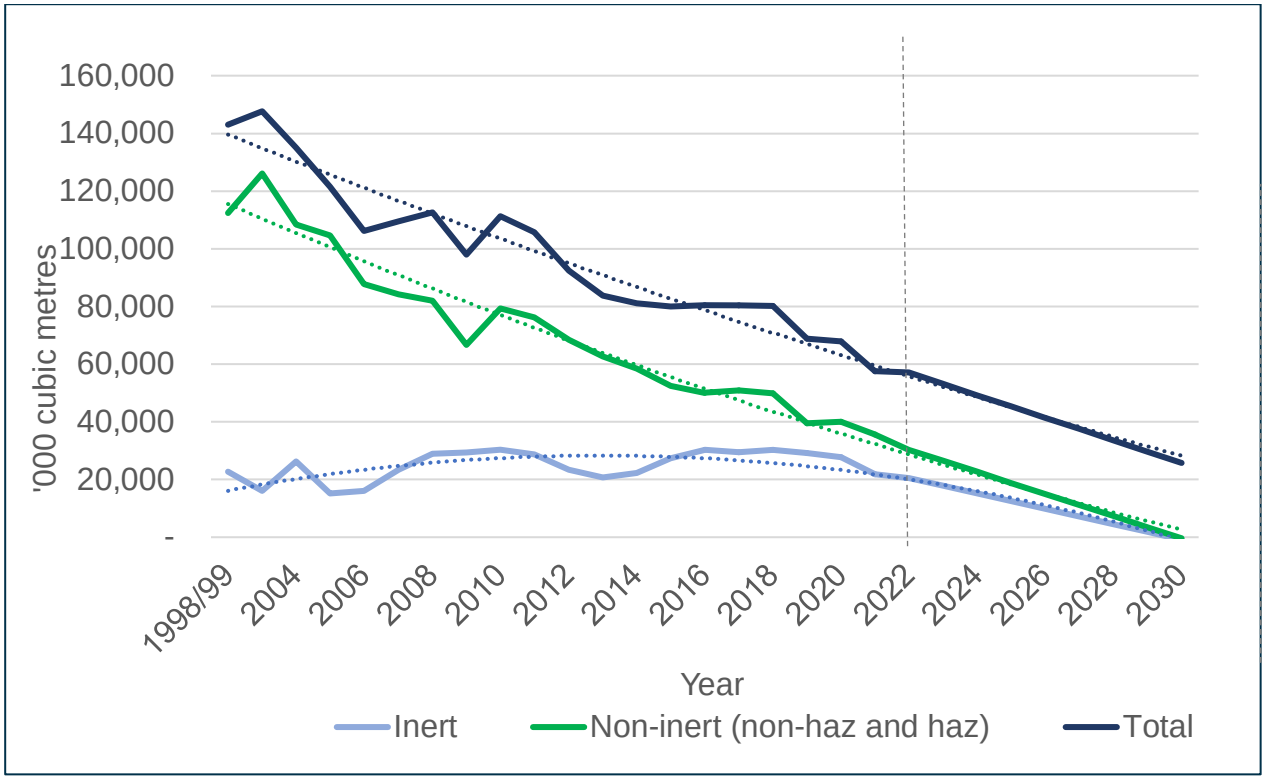


Figure 15-4: Remaining Landfill Capacity in London and Southeast

15.3.23. Baseline data indicates that in the absence of future provision, 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 15-4** shows that in the absence of future provision, waste capacity in London and the Southeast is forecast to reduce from 2021 to 2030 by as much as:

- **Inert Waste:** 100% (no capacity after 2029);
- Non-inert Waste (non-hazardous and hazardous): 100% (no capacity after 2029); and
- **Total Waste:** 55% to 25.7 Mm^3.

15.3.24. Whilst the data in **Figure 15-4** indicates that there would be no remaining capacity by the first year of full operation (2030), the collection and analysis of landfill data will remain instrumental in the accuracy of this assertion.

15.3.25. Further to the data provided in **Table 15-7**, and to comply with the assessment criteria requirements of the IEMA Guide (**Ref 15.30**), the following hazardous (merchant) waste data is presented to confirm that at the end of 2021, England had 12.1Mm^3 of remaining capacity for hazardous (merchant) waste (**Ref 15.40**).

Table 15-8: Remaining Hazardous Waste Landfill Capacity in England (2021)

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

15.3.26. Existing commercial business within the Site Boundary would remain at their current locations should the Proposed Scheme not proceed. These include Riverside 1, the Middleton Jetty and the Munster Joinery Warehouse. Riverside 2 would also be operational in the future baseline.

15.3.27. In the future baseline (in the absence of the Proposed Scheme) it is considered that the current land use within the Site Boundary would be influenced by the operation of Riverside 2, which is currently under construction. The ES for Riverside 2 concluded that there would be no significant effects for materials and waste from the 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.

15.3.28. The possible exception to this is that as infrastructure ages within the Site Boundary increased maintenance and repair work may be required, and even (potentially) demolition / deconstruction activities deployed. The generation of such arisings would in most cases be expected to be temporary and hence would not contribute to long-term impacts.

15.4. STUDY AREA

15.4.1. The study areas that are applicable to the Proposed Scheme are as defined in the IEMA Guide (**Ref 15.30**). Study areas for the assessment include:

- **Development Study Area** comprises the extent of the Site Boundary; and
- **Expansive Study Area** extends to the availability of construction materials and the capacity of waste management facilities within the London and the Southeast regions and the UK.

15.5. SENSITIVE RECEPTORS / RESOURCES

15.5.1. The following sensitive receptors have been identified and will be considered within the environmental assessment:

- **Material Resources** – consumption impacts on materials' immediate and long term availability, which results in the permanent depletion of natural resources.

- **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.

15.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION PHASE

15.6.1. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include the adoption of Best Practicable Means, examples of which are included in **Table 15-9**.

Table 15-9: Potential Design, Mitigation and Enhancement Measures

Element	Description	Timing / Process
Materials	Identification and specification of material resources that can be acquired responsibly, in accordance with BES 6001 Responsible Sourcing of Construction Products (**Ref 15.41**)	Design and construction
	Design for resource optimisation: simplifying layout and form; using standard sizes; balancing cut and fill; and maximising the use of renewable materials, and materials with recycled or secondary content.	Design
	Design for off-site construction: maximising the use of pre-fabricated structures and components, encouraging a process of assembly rather than construction.	Design
	Design for the future: considering how materials can be designed to be more easily adapted over an asset lifetime, and how deconstructability and demountability of elements can be maximised at end-of-first-life.	Design
	Identify opportunities to minimise the export and import of material resources.	Design and construction
	Manage engineering plan configurations and layouts to ensure the most effective use of materials and arisings can be achieved.	Design and construction
	As part of a CoCP, implement a Materials Management Plan in accordance with the CL:AIRE Definition of Waste: Code of Practice (**Ref 15.42**).	Construction

Element	Description	Timing / Process
Waste	Engage early with contractors to identify possible enhancement and mitigation measures and to identify opportunities to reduce waste through collaboration and regional synergies.	Design and Procurement
	Design for recovery and reuse: identifying, securing and using material resources at their highest value, whether they already exist on site, or are sourced from other developments.	Design
	Ensure arisings are properly characterised before or during design, to maximise the potential for highest value reuse.	Design
	Identify areas for stockpiling and storing wastes that will minimise quality degradation and leachate and will minimise damage and loss.	Design and construction
	As part of a CoCP, specify management requirements for waste and arisings and capture information and data on site arisings recovered and diverted from landfill, and developing a Design SWMP.	Design

OPERATION PHASE

15.6.2. There are no design, mitigation and enhancement measures identified for materials and waste during the operation phase. As outlined in **Section 15.7** operational effects are proposed to be scoped out.

15.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

15.7.1. The potential likely significant effects associated with the construction phase are:

- In applying a worst-case scenario, impacts from the consumption of large quantities of primary construction materials have the potential to be adverse, direct and permanent and could result in a significant adverse effect on the environment through the depletion of natural resources and degradation of the natural environment; and
- The generation and disposal of waste during construction which cannot be diverted from landfill have the potential for an adverse impact on regional landfill void capacity and could result in a significant adverse effect.

OPERATION PHASE

15.7.2. There are not considered to be any potential likely significant effects associated with the operation phase of the Proposed Scheme. Arisings generated during operation:

- are likely to be minimal in volume e.g. small quantities of filter cake from filtration (to hazardous landfill, off site);
- will be diverted from landfill e.g. amine-loaded waste from the Carbon Capture Project and and desiccant beds from the Hydrogen Project (to be incinerated off site); and
- will be managed in accordance with both environmental permits and relevant legislation.

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

15.7.3. The impacts scoped in or out for the materials and waste assessment are set out in **Table 15-10**:

Table 15-10: Materials and Waste – Impacts Scoped in or Out of Further Assessment

Impacts	Phase	Scoped In	Scoped Out	Justification
Impacts associated with the extraction of raw resources and the manufacture of products	Construction and Operation		✓	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 operation of the Proposed Scheme requires direct extraction, processing and manufacture of raw resources.
Consumption of material resources associated with the construction of the Proposed Scheme	Construction (including all construction, demolition and excavation activities)	✓		Further information is required to assess the potential impacts of the Proposed Scheme on regional material resource availability in combination with (for example) the use of site won materials and recycled / secondary materials. These materials are a finite resource and, in the absence of comprehensive data for the entire site, a current worst-case scenario has been applied that anticipates one or more materials (steel) required is between 6-10% by volume of the regional (or where justified, national) baseline availability. In applying a worst-case scenario, impacts would be expected to be adverse, direct and permanent, and would result in significant effects, i.e. the depletion of natural

Impacts	Phase	Scoped In	Scoped Out	Justification
				resources and local or regional stocks that result in the degradation of the natural environment.
Disposal and recovery of waste associated with the construction of the Proposed Scheme	Construction (including all construction, demolition and excavation activities)	✓		Further information is required to assess the potential impacts of the Proposed Scheme on landfill capacity. Site preparation and remediation (incorporating groundworks) and excavation, demolition and other clearance works are expected to produce arisings including, but not limited to, topsoil, earthworks, vegetation, asphalt, concrete, masonry, metalwork and possibly asbestos. In addition, arisings will be generated by the dredging of the River Thames to facilitate construction of the new Proposed Jetty. The method for disposal or recovery of dredged arisings will be confirmed as the design of the Proposed Scheme progresses. Some of these arisings could (subject to geotechnical information and contamination testing) be reused. Any impacts due to the disposal or reuse(either to reflect the chosen option, or to reflect optionality if that is still retained) of dredged arisings will be considered accordingly in the PEIR and the ES (including the plant that may be needed to be used to facilitate re-use of the dredged arisings on site within the relevant topic chapters). It is reasonable to assert that any wastes that cannot be diverted from landfill are expected to have an adverse

Impacts	Phase	Scoped In	Scoped Out	Justification
				impact on landfill capacity in the London and the Southeast regions, and could result in significant adverse effects i.e. a significant reduction in regional landfill void capacity.
Consumption of material resources associated with the Proposed Scheme during operation	Operation		✓	The continued operation of the Proposed Scheme is not anticipated to consume material resources beyond those required for routine repair and maintenance. As such, the impacts associated with material resource consumption are considered to be minimal and not significant. It is important to note that the operation of the Proposed Scheme will have no impact on the capacity of Riverside 1 and Riverside 2 in their role as energy from waste facilities. As such, the Proposed Scheme will have no impact on the quantity of waste materials that are supplied by customers to Riverside 1 and Riverside 2, or the processing of residual wastes, by those facilities.
Disposal and recovery of waste associated with the Proposed Scheme beyond the first year of operation	Operation		✓	The operation of the Proposed Scheme beyond the first year of commissioning is anticipated to generate minimal waste arisings from routine maintenance and repairs. In addition, waste derived from the operation of the plant (e.g. staff welfare waste) is expected to be managed within Riverside 1 or Riverside 2 or sent off site for incineration or disposal to hazardous landfill. Arisings generated during operation:

Impacts	Phase	Scoped In	Scoped Out	Justification
				• are likely to be minimal in volume e.g. small quantities of amines, filter cake from filtration (to hazardous landfill, off site), and reclaimer unit waste and desiccant beds; • will be managed in accordance with both existing environmental permits and relevant legislation; • will be subject to good and best practice measures embedded in a standalone Operational Waste Management Plan (which will be prepared as a technical report to support the DCO application); and • where the result of jetty dredging – will be disposed of at sea under licence. As such, the impacts associated with operational waste generation and disposal against available landfill void capacity are considered to be minimal.
Impacts from the transportation of material resources and waste to and from the Site Boundary	Construction and Operation		✓	The approach to assessing impacts associated with transportation is as part of **Chapter 4: Air Quality**, **Chapter 5: Noise and Vibration**, **Chapter 12: Greenhouse Gases** and **Chapter 17: Landside Transport**.
Impacts on human health and controlled waters as a result of contaminated site	Construction and Operation		✓	Impacts and effects on human health and controlled waters will be considered in the **Chapter 16: Ground Conditions and Soils** assessment, as appropriate to that specialist topic.

Impacts	Phase	Scoped In	Scoped Out	Justification
arisings from the Proposed Scheme				

15.8. PROPOSED ASSESSMENT METHODOLOGY

15.8.1. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with LBB and the EA.

15.8.2. The IEMA Guide (**Ref 15.30**) will be used to assess the potential effects from the Proposed Scheme, using the process and significance criteria it sets out. It is anticipated that Method W1 (Void Capacity, as detailed in the IEMA Guide) will be used to best reflect the scale and nature of the Proposed Scheme.

15.8.3. In accordance with the IEMA Guide, the assessment will be 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 on-site reuse, off-site 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.

15.8.4. 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.

15.8.5. The magnitude of impacts from the Proposed Scheme that will be considered in the assessment include:

- anticipated reductions in availability (stocks, production and/or sales) of materials regionally and nationally; and
- anticipated reductions in the landfill void capacity of regional and national infrastructure.

15.8.6. The likely types and estimated quantities of material resources required (including arisings generated from site) for the Proposed Scheme will be assessed. Impacts will be evaluated against regional (and where justified, national) materials availability data, where information is obtainable.

- The likely types and estimated quantities of waste to be generated by the Proposed Scheme will be assessed. Impacts will be evaluated against the capacity of regional (and where appropriate, national) landfill infrastructure.

SIGNIFICANCE CRITERIA

15.8.7. The significance level attributed to each effect will be assessed based on the sensitivity of the affected receptor(s) and the magnitude of change arising from the Proposed Scheme, in accordance with the methodology outlined in **Chapter 3: EIA Methodology**.

15.8.8. The criteria for assessing sensitivity of materials and waste receptors are set out in **Table 15-11**. The sensitivity of materials will be determined by identifying where one or more of the criteria from the following thresholds are met. The sensitivity of waste is determined by considering the baseline/future baseline of regional (or where justified, national) landfill void capacity across the construction phase.

Table 15-11: 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 capacity is expected to…	Hazardous Waste Criteria Landfill void 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**	...reduce minimally: by <1% as a result of wastes forecast.	...reduce minimally: by <0.1% 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 capacity is expected to…	Hazardous Waste Criteria Landfill void capacity is expected to…
	…are available comprising a high proportion of sustainable features and benefits compared to industry-standard materials.		
Medium	…are forecast (through trend analysis and other information) to suffer from some potential issues regarding supply and stock; **and/or** …are available comprising some sustainable features and benefits compared to industry-standard materials.	...reduce noticeably: by 1-5% as a result of wastes forecast.	...reduce noticeably: by 0.1-0.5% as a result of wastes forecast.
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	... reduce very considerably	... reduce very considerably (by

Sensitivity	Materials Criteria **On balance, the key materials required for the construction of the Proposed Scheme…**	Inert and Non-hazardous Waste Criteria **Landfill void capacity is expected to…**	Hazardous Waste Criteria **Landfill void capacity is expected to…**
	production, supply and/or stock; **and/or** …comprise no sustainable features and benefits compared to industry-standard materials.	(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.	>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); • support the drive to a circular economy; or • in some other way reduce lifetime environmental impacts. # by the relevant local planning authority.		

15.8.9. **Table 15-12** 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 (**Ref 15.30**), will be used.

Table 15-12: 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 capacity	Hazardous waste criteria The percentage depletion of remaining landfill void 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 capacity baseline[$] by <1%.	Waste generated by the development will reduce national landfill void capacity baseline[$] 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 capacity baseline[$] by 1-5%.	Waste generated by the development will reduce national landfill void capacity baseline[$] 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 capacity baseline[$] by 6-10%.	Waste generated by the development will reduce national landfill void capacity baseline[$] by <0.5-1%
Major	...one or more materials is >10% by volume of the regional* baseline availability.	Waste generated by the development will reduce regional*	Waste generated by the development will reduce national

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 capacity	Hazardous waste criteria The percentage depletion of remaining landfill void capacity
		landfill void capacity baseline[$] by >10%.	landfill void capacity baseline[$] by >1%
Notes	* or where justified, national. [$] forecast as the worst-case scenario, during a defined construction phase.		

15.8.10. The overall significance of effects will be determined based on the matrix shown in **Chapter 3: EIA Methodology** which aligns with the IEMA Guide. Effects that are classified as moderate or above are considered to be significant. Effects classified as below minor or below are considered to be not significant.

15.9. ASSESSMENT LIMITATIONS AND ASSUMPTIONS

15.9.1. The following limitations and assumptions have been identified:

- The assessment of material assets and waste arisings will be based upon the validity of the information gathered in regard to the resources that are expected to be consumed and waste that is expected to arise during the construction of 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);
- In line with the IEMA Guide, a lifecycle assessment (including embodied carbon and water) of materials will not be part of the assessment process. Embodied carbon will be assessed in **Chapter 12: Greenhouse Gases**; and
- 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 the assessment.

15.10. REFERENCES

Ref 15.1: DECC. (2011). 'Overarching National Policy Statement for Energy (EN-1)''.

Ref 15.2: Department for Business, Energy and Industrial Strategy. (2021). 'Draft Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf

Ref 15.3: Ministry of Housing, Communities and Local Government. (2021). 'National Planning Policy Framework'. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

Ref 15.4: Greater London Authority. (2021). 'The London Plan'. Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

Ref 15.5: London Borough of Bexley. (2012). 'Bexley Core Strategy'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Core-Strategy.pdf

Ref 15.6: London Borough of Bexley. (2004). 'Unitary Development Plan'. https://www.bexley.gov.uk/sites/default/files/2021-12/Bexley-unitary-development-plan-written-statement-2004.pdf

Ref 15.7: London Borough of Bexley. (2021). 'Draft Local Plan'. Available at: https://www.bexley.gov.uk/services/planning-and-building-control/planning-policy/local-plan-review

Ref 15.8: DEFRA. (2021). 'Waste Management Plan for England'. Available at: https://www.gov.uk/government/publications/waste-management-plan-for-england-2021

Ref 15.9: DCLG. (2014). 'National Planning Policy for Waste'. Available at: https://www.gov.uk/government/publications/national-planning-policy-for-waste

Ref 15.10: DEFRA. (2018). 'Our Waste, Our Resources: A Strategy for England'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765914/resources-waste-strategy-dec-2018.pdf

Ref 15.11: Greater London Authority. (2018). 'London Environment Strategy'. Available at: https://www.london.gov.uk/programmes-and-strategies/environment-and-climate-change/london-environment-strategy

Ref 15.12: London Borough of Bexley. (2011). 'Bexley's Environmental Sustainability Strategy'. Available at: Bexley's Environmental Sustainability Strategy (adopted version)

Ref 15.13: London Borough of Bexley. (2021). 'Southeast London Joint Waste Planning Technical Paper'. Available at: https://www.bexley.gov.uk/sites/default/files/2022-02/SD27-draft-southeast-london-joint-waste-planning-technical-paper.pdf

Ref 15.14: London Borough of Barking and Dagenham. (2010). 'Adopted Core Strategy'. Available at: https://www.lbbd.gov.uk/sites/default/files/2022-08/Adopted-Core-Strategy_0.pdf

Ref 15.15: London Borough of Barking and Dagenham. (2022). 'Local Plan (Emerging)'. Available at: https://www.lbbd.gov.uk/planning-building-control-and-local-land-charges/planning-guidance-and-policies/local-plan

Ref 15.16: Havering London Borough. (2021). 'Havering Local Plan 2016- 2031'. Available at: https://www.havering.gov.uk/download/downloads/id/5300/havering_local_plan_2016_-_2031.pdf

Ref 15.17: Marine Management Organisation. (2021). 'South East Inshore Marine Plan 2021'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004493/FINAL_South_East_Marine_Plan__1_.pdf

Ref 15.18: EU (2008) Directive 2008/98/EC of the European parliament and of the council of 19 November 2008 on waste and repealing certain directives. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0098

Ref 15.19: HM Government. (2022). 'Environment Act 2021'. Available at: legislation.gov.uk: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

Ref 15.20: HM Government. (2020). 'The Waste and Environmental Permitting etc. (Legislative Functions and Amendments etc.) (EU Exit) Regulations'. Available at: https://www.legislation.gov.uk/ukdsi/2020/9780348213294/contents

Ref 15.21: HM Government. (2016). 'The Environmental Permitting (England and Wales) Regulations (as amended)'. Available at: https://www.legislation.gov.uk/uksi/2016/1154/contents/made

Ref 15.22: HM Government. (2012). 'The Controlled Waste (England and Wales) Regulations'. Available at: https://www.legislation.gov.uk/uksi/2012/811/contents/made

Ref 15.23: HM Government. (2012). 'The Waste (England and Wales) Regulations'. Available at: https://www.legislation.gov.uk/uksi/2012/1889/made

Ref 15.24: HM Government. (2005). 'The Clean Neighbourhoods and Environment Act'. Available at: https://www.legislation.gov.uk/ukpga/2005/16/contents

Ref 15.25: HM Government. (2005). 'Hazardous waste (England and Wales) Regulations'. Available at: https://www.legislation.gov.uk/uksi/2005/894/contents/made

Ref 15.26: HM Government. (1998). 'Waste Minimisation Act'. Available at: https://www.legislation.gov.uk/ukpga/1998/44/contents

Ref 15.27: HM Government. (1990). 'The Environmental Protection Act'. Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents

Ref 15.28: HM Government. (1989). 'The Control of Pollution (Amendment) Act'. Available at: https://www.legislation.gov.uk/ukpga/1989/14/contents

Ref 15.29: Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government. (2021). 'National Planning Practice Guidance, Healthy and Safe Communities'. Available at: https://www.gov.uk/guidance/health-and-wellbeing

Ref 15.30: Institute of Environmental Management and Assessment. (2020). 'Guide to Materials and Waste in Environmental Impact Assessment'. Available at: https://www.iema.net/resources/reading-room/2020/03/30/materials-and-waste-in-environmental-impact-assessment

Ref 15.31: Department for Business, Energy and Industrial Strategy. (2023). 'Monthly Bulletin of Building Materials and Components'. Available at: https://www.data.gov.uk/dataset/75ee36ed-21f7-4d7b-9e7c-f5bf4546145d/monthly-statistics-of-building-materials-and-components

Ref 15.32: Southeast Aggregates Working Party. (2020). 'Annual Report 2018'. Available at: https://documents.hants.gov.uk/see-awp/SEEAWP-annual-report-2018.pdf

Ref 15.33: London Aggregates Working Party. (2019). 'Annual Report 2019'. Available at: https://www.london.gov.uk/sites/default/files/london_aggregates_monitoring_report_2019.pdf

Ref 15.34: Mineral Products Association. (2020). 'Profile of the UK Mineral Products Industry'. Available at: https://www.mineralproducts.org/Facts-and-Figures/Profile-of-the-UK-Mineral-Products-Industry.aspx

Ref 15.35: UK Steel Production. (2021). 'United Kingdom Steel Production I 1969-2020 Data I 2021-2022 Forecast I Historical'. Available at: https://tradingeconomics.com/united-kingdom/steel-production

Ref 15.36: DEFRA. (2021). 'Natural England MAGIC mapping'. Available at: http://magic.defra.gov.uk/

Ref 15.37: DEFRA. (2009). 'Basis of the UK BAP target for the reduction in use of peat in horticulture - SP0573'. Available at: http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=15991

Ref 15.38: DEFRA. (2022). 'UK Statistics on Waste'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/784263/UK_Statistics_on_Waste_statistical_notice_March_2019_rev_FINAL.pdf

Ref 15.39: Environment Agency. (2023). 'Waste Data Interrogator: Waste Management Information 2021'. Available at: https://data.gov.uk/dataset/d409b2ba-796c-4436-82c7-eb1831a9ef25/2019-waste-data-interrogator

Ref 15.40: Environment Agency. (2023). '2021 Remaining Landfill capacity, England – Version 2'. Available at: https://data.gov.uk/dataset/237825cb-dc10-4c53-8446-1bcd35614c12/remaining-landfill-capacity

Ref 15.41: BRE Group. (2016). 'BES 6001 The Framework Standard for Responsible Sourcing'. Available at: https://www.greenbooklive.com/filelibrary/responsible_sourcing/BES-6001--Issue-3.1.pdf

Ref 15.42: CL:AiRE. (2011). 'The Definition of Waste: Development Industry Code of Practice'. Available at: https://www.claire.co.uk/projects-and-initiatives/dow-cop/28-framework-and-guidance/111-dow-cop-main-document

16. GROUND CONDITIONS AND SOILS

16.1. INTRODUCTION

16.1.1. This chapter considers the potential impacts of the Proposed Scheme on ground conditions and soils during construction and operation, and any potential significant adverse environmental effects. It sets out the proposed methodology for the ground conditions and soils assessment and identifies those impacts that can be scoped out of the assessment. Where necessary further assessment will be presented in the ES.

16.2. POLICY, LEGISLATION, AND GUIDANCE

16.2.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is as set out in **Table 16-1**:

Table 16-1: Ground Conditions and Soils – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011 (Ref 16.1)	The relevant assessment principles in terms of generic impacts from Part 5 of NPS EN-1 ('Biodiversity and Geological Conservation', 'Land Use including Open Space, Green Infrastructure and Green Belt' and 'Water Quality and Resources') are set out below: • Biodiversity and Geological Conservation, Paragraphs 5.4.3 to 5.4.4: *"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"*. • Water Quality and Resources. Paragraphs 5.16.2 to 5.16.3: "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

Policy / Legislation / Guidance	Description
	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 for Energy EN-1 2021 (Ref 16.2)	The Government has published a draft update to the Overarching National Policy Statement for Energy. For air quality the Draft NPS EN-1 is largely the same as in the NPS EN-1 2011.
National Planning Policy Framework (NPPF) 2021 (Ref 16.3)	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 below: 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:*

Policy / Legislation / Guidance	Description
	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, 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 an decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including*

Policy / Legislation / Guidance	Description
	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 pressure, prevention of leakage of gas and the avoidance of pollution".*
The London Plan 2021 (Ref 16.4)	Sets out an integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years. The following policies are particularly pertinent 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 SI 17 Protecting and Enhancing London's Waterways: *"Development plans should support*

Policy / Legislation / Guidance	Description
	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".
London Borough of Bexley Core Strategy 2012 (Ref 16.5)	Sets out a spatial planning framework for London Borough of Bexley until 2026. The following chapter is particularly pertinent to ground conditions and soils: Policy CS18 Biodiversity and Geology: *"The Council will protect and enhance its biodiversity and geological assets, whilst complying with national and regional policy and guidance …e) Recognising the value of landforms, landscapes, geological processes and soils as contributors to the geodiversity of the borough, and evaluating whether it is appropriate to designate any Regionally or Locally Important Geological Sites (RIGS or LIGS) in the borough; f) enabling environmental education opportunities at the borough's schools, and investigating opportunities to involve the wider community in biodiversity or geodiversity restoration and enhancement through projects".*
London Borough of Bexley Unitary Development Plan 2004 (Ref 16.6)	Contains the Council's intended policies and proposals for the borough. The relevant section for ground conditions and soils is contained within Chapter 5, whereby, *"The Council will require applicants to survey sites that are known or suspected to be contaminated to determine the source of any pollutants and any remedial measures necessary to prevent these causing hazards either*

Policy / Legislation / Guidance	Description
	during construction or through subsequent use of the site".
London Borough of Bexley Draft Local Plan 2021 (Ref 16.7)	The new Local Plan is awaiting adoption and will then replace the Bexley Core Strategy and Saved UDP policies 2012. It contains a number of policies relating to ground conditions and soils within the borough including: Policy DP28: Contaminated Land and Development and Storage of Hazardous Substances: *"1. Where development is proposed on contaminated land or potentially contaminated land, a desktop study and site investigation, including appropriate proposals for remediation will need to be carried out where required. 2. 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 (HSE)."* Policy SP13: Protecting and Enhancing Water Supply and Wastewater Infrastructure: *"Increased amounts of development can lead to reduced water quality through pollution of ground or surface water, including pollution to underground water resources" Therefore, "The Council will:* *a) work with Thames Water in relation to local wastewater infrastructure requirements and support wastewater treatment infrastructure investment to accommodate London's growth and climate change impacts; b) promote improvements to water supply infrastructure, particularly within the defined sustainable development locations, to contribute to security of supply in a timely, efficient and sustainable manner taking energy consumption into account; c) promote the protection and improvement of the water environment in line with the Thames River Basin Management Plan, taking account of catchment plans".*
Legislation	

Policy / Legislation / Guidance	Description
Part 2A of the Environmental Protection Act 1990 (Ref 16.8)	Establishes a legal framework for dealing with contaminated land in England. The Part 2A definition of contaminated land is *"any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substance in, on or under the land that; a) Significant harm is being caused or there is significant possibility of such harm being caused; or b) Significant pollution to controlled waters is being caused, or there is a significant possibility of such pollution being caused".*
The Construction (Design and Management) Regulations 2015 (CDM Regulations) (Ref 16.9)	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.
Control of Substances Hazardous to Human Health (COSHH) 2002 (Ref 16.10)	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 (Ref 16.11)	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) (Ref 16.12)	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

Policy / Legislation / Guidance	Description
	environmental permitting, enforcement notices and other enforcement measures and powers of the regulator.
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 16.13)	Regulations that provide a framework for managing the water environment.
The Water Act 2014 (Ref 16.14)	The Water Act 2014 is an update to the Water Recourses 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 Boundary.
Guidance	
National Planning Practice Guidance (2021) (Ref. 16.15)	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.
C552 Contaminated Land Risk Assessment: A Guide to Good Practice 2001 (Ref 16.16)	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 (Ref 16.17)	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.

Policy / Legislation / Guidance	Description
C733 Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks 2014 (Ref 16.18)	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 (Ref 16.19)	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 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 (Ref 16.20)	Presents clear practical guidance on how to include for the potential effects of climate change in controlled waters risk assessment for land contamination.
Groundwater Protection Technical Guidance 2017 (Ref 16.21)	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.

16.3. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

16.3.1. The key sources of information on baseline ground conditions and soils will be:

- Groundsure Report for the Proposed Scheme (**Ref 16.22**);
- British Geological Survey (BGS) Geology Online Viewer (**Ref 16.23**);
- BGS GeoIndex Onshore Online Viewer (**Ref 16.24**);
- Multi Agency Geographic Information for the Countryside (MAGIC) (**Ref 16.25**);
- Google Earth satellite imagery (**Ref 16.26**); and
- Preliminary Risk Assessment for the Proposed Scheme (**Ref 16.27**).

16.3.2. The information gathered and presented within the ES for Riverside 2 will inform the baseline relevant to ground conditions and soils, where relevant.

16.3.3. 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 Boundary.

16.3.4. Recent data shows that Belvedere Mill ceased activity circa 2001. Satellite imagery and aerial photographs show that Riverside 1 began construction circa 2009 and has been operational within the Site Boundary since 2011. At the time of writing, construction works for Riverside 2 are being undertaken.

16.3.5. 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 sewage works to the west and Belvedere Industrial Estate to the east/southeast.

16.3.6. Based on historical BGS records, the anticipated geology underlying the Site is summarised in **Table 16-2** below:

Table 16-2: Ground Conditions and Soils - 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.

Stratum		Description
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 with a 'peppering' of dark-coloured glauconite grains. Sparse white mica occurs throughout. Rare coarse gravel is present in places in London.
	Upper Chalk Formation	White chalks (microporous coccolithic limestone) with beds of flint, nodular chalks, hardgrounds and marl seams.

16.3.7. The Environment Agency classify 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. 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 10: Water Environment and Flood Risk**.

16.3.8. The primary sensitive surface water feature within the Site Boundary is the River Thames. There are numerous records of other surface water features onsite which are detailed in **Chapter 10: Water Environment and Flood Risk**.

16.3.9. No Groundwater Dependant Terrestrial Ecosystems (GWDTEs) are situated near enough to the Site Boundary to be impacted by the Proposed Scheme.

16.3.10. An active licenced surface water abstraction point is located 15m to the west of the Site Boundary abstracts from the River Thames.

FUTURE BASELINE

16.3.11. 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 assessment of ground conditions and soils.

16.4. STUDY AREA

16.4.1. Study Areas have been identified for human health (in respect of impacts arising from contamination matters only), controlled waters, building fabric and services, and agricultural land and soils:

- Human Health: For both the construction phase and operation phase, the Study Area will be limited to 250m from the Site Boundary, as per best practice documents, including Guidance for the Safe Development of Housing on Land Affected by Contamination: R&D Publication 66 (**Ref 16.28**). The 250m distance is typical at the hazard identification stage of an assessment based on professional judgement.
- Controlled Waters: For both the construction phase and operation phase, the Study Area will be limited to 1km from the Site Boundary, based on site specifics (such as the underlying geology, an appreciation of the water environment and previous land use discussed above).
- Building Fabric and Services: For both the construction and operation phase, the Study Area will be within the Site Boundary only.
- Agricultural land and soils: For both the construction and operation phase, the Study Area will be within the Site Boundary only.

16.5. SENSITIVE RECEPTORS / RESOURCES

16.5.1. The following sensitive receptors have been identified:

- Human Health:
  - site users e.g., site visitors, and staff;
  - construction staff; and
  - third party neighbours (commercial, hospitality and residential).
- Controlled Waters:
  - groundwater within the Secondary Undifferentiated Aquifer, Secondary A Aquifers and Principal Aquifer;

  - surface Water - River Thames and other surface water features (detailed in **Chapter 10: Water Environment and Flood Risk**); and
  - GWDTEs.
- Building Fabric and Services:
  - below ground services;
  - building structures; and
  - Other: agricultural land and soils.

16.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION PHASE

16.6.1. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- ground investigation undertaken prior to the construction phase;
- A Code of Construction Practice (CoCP) including, but not limited to, measures addressing materials management, the suitable storage of fuels, and site waste management;
- testing of dredged arisings prior to re-use on site, if this approach is taken;
- A Piling Risk Assessment;
- A Materials Management Plan;
- An Earthworks Specification;
- A Remediation Strategy (if required); and
- remediation (if required and in accordance with the method set out in the Remediation Strategy).

OPERATION PHASE

16.6.2. All operational activities will be regulated under the Environmental Permitting (England and Wales) Regulations 2016 (**Ref 16.29**) and under the effective implementation of an environmental management system, certified to ISO14001:2015 (**Ref 16.30**). The Applicant will pursue appropriate permitting relating to the operation of the Proposed Scheme.

16.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

16.7.1. The potential likely significant effects associated with potential exposure to contamination within the underlying soils / groundwater during the construction phase are on:

- site users and staff;
- construction staff;
- third party neighbours;

- controlled waters; below ground services and building structures; and
- agricultural land and soils.

16.7.2. The management of potential contamination resulting from the construction activities, such as pollution of controlled water from spillages, is outlined in **Chapter 10: Water Environment and Flood Risk**.

OPERATION PHASE

16.7.3. 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. The methods to appropriate remediation may include those identified in **Section 16.6**.

16.7.4. Further, any imported material, if required, will be validated for chemical quality and suitability for placement at the required depth prior to use. Therefore, the potential exposure of receptors to contamination during the operation phase is not considered to be significant and is proposed to be scoped out of further assessment.

16.7.5. Given that remediation, if necessary, will be based on the design of the Proposed Scheme, it is considered that there are no plausible pathways (i.e. enclosed or confined spaces/structures) through which ground gases and vapours (including radon) may accumulate and cause effects to human health (via inhalation of asphyxiant) or buildings and services (explosion risk). Therefore, the potential for the presence of ground gas and vapours to pose effects on the identified receptors during the operational stage is not considered to be significant and is proposed to be scoped out of further assessment.

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

16.7.6. The impacts scoped in or out for the ground conditions and soils assessment are as set out in **Table 16-3**:

Table 16-3: Ground Conditions and Soils - Impacts Scoped In or Out of Further Assessment

Impacts	Phase	Scoped In	Scoped Out	Justification
Site users and staff in relation to potential exposure to contamination within the underlying soils / groundwater.	Construction	✓		Direct contact with potentially contaminated soils / groundwater during groundworks or via airborne migration of disturbed contaminants. Inhalation of ground gases within building spaces, service corridors or excavations.
Construction staff in relation to potential exposure to contamination within the underlying soils / groundwater and reuse of dredged arisings.	Construction	✓		Direct contact with potentially contaminated soils / groundwater during groundworks or via airborne migration of disturbed contaminants including if dredged arisings are to be reused) Inhalation of ground gases within building spaces.
Third party neighbours in relation to potential exposure to contamination within underlying soils / groundwater.	Construction	✓		Direct contact with potential contaminants via airborne migration, surface runoff processes and lateral migration through subsurface. Inhalation of ground gases within building spaces.
Controlled waters in relation to potential contamination within the underlying soils / groundwater.	Construction	✓		Preferential pathways created during piling works. Potential for increased mobilisation of contaminants during groundworks and transfer to controlled waters (e.g. via surface run-off and airborne migration).

Impacts	Phase	Scoped In	Scoped Out	Justification
Below ground services and building structures in relation to potential contamination within the underlying soils / groundwater.	Construction	✓		Migration and accumulation of ground gases within building structures and below ground services corridors.
Agricultural land and soils in relation to potential contamination within the underlying soils / groundwater.	Construction		✓	The risks of effects during the construction phase have been scoped out as there is no agricultural land nor soils present within the Site Boundary.
Human heath, controlled waters, building fabric and services and agricultural soils during the operation phase.	Operation		✓	The risk of effects during the operational phase is proposed to be scoped out on the basis that any contamination identified during the construction phase will be remediated.

16.8. PROPOSED ASSESSMENT METHODOLOGY

16.8.1. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with LBB and the Environment Agency. Based on the likely environmental impacts set out above, the scope of the assessment will be as follows.

16.8.2. The Environment Agency's LCRM guidance (**Ref 16.19**) is to be followed by all parties engaged in and responsible for land contamination. In the context of ground conditions and soils, the LCRM provides a technical framework in the understanding of how contamination issues that may arise could be managed.

16.8.3. The LCRM recommends the use of a Conceptual Site Model (CSM), comprising three elements: a source, a pathway, and a receptor. Each element is described below:

- Source – The 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 receptors).

16.8.4. Without each of a source, pathway and 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.

16.8.5. The CSM will be 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 will be identified.

16.8.6. The assessment will be prepared in accordance with the legislation and guidance referenced above in **Section 16.2**.

16.8.7. The level of risk has been evaluated in accordance with the methodology set out in CIRIA C552 (**Ref 16.16**). This methodology involves classification of the consequence and probability associated with each potential contaminant linkage and thereby the corresponding level of risk (risk category).

16.8.8. The framework for classifying consequence, presented in full in Table 6.3 of CIRIA C552 (**Ref 16.16**), is summarised in **Table 16-4** below. The consequence classification does not depend on the probability that the consequence will be realised.

Table 16-4: 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; and • 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; and • 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; and • 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.

16.8.9. 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) (**Ref 16.8**).

16.8.10. The framework for classifying probability, presented in full in Table 16.4 of CIRIA C552 (**Ref 16.16**), is summarised in **Table 16-5** below.

Table 16-5: 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.

Classification	Definition
Unlikely	It is improbable that an event would occur, even in the very long term.

16.8.11. 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 (**Ref 16.16**) and shown in **Table 16-6** below.

Table 16-6: 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

SIGNIFICANCE OF EFFECT CRITERIA

16.8.12. The significance of effects for land contamination on human health, controlled waters, building fabric and services and agricultural soils will be assessed by comparing the difference in risk (as described above) for each contaminant linkage for baseline conditions to those at the construction phase. 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

16.8.13. Assessment of receptor value (sensitivity) for ground conditions will follow the framework described in **Table 16-7** which is based on Table 3.11 of the DMRB Sustainability & Environmental Appraisal, LA 109: Geology and Soils (**Ref 16.31**). Negligible sensitivity has been removed, as it is deemed irrelevant as no receptor (in terms of ground conditions) is classed as negligible.

16.8.14. Factors that may affect the sensitivity of the likely receptor include:

- Human Health – age, weight, sex, duration onsite and distance from the Site;
- Controlled Waters - distance from the Site and resource potential; and
- Building Fabric and Services: building design including factors such as gas protection measures and depth (below ground level) of services installations.

Table 16-7: Classification of Value (Sensitivity) of Receptors

Receptor Value (Sensitivity)	Criteria	Typical Examples	
Very High	Human health: very high sensitivity land use.	Contamination	Construction and maintenance workers (where extensive earthworks are proposed). Residential properties or allotments.
	Nationally significant attribute of high importance.	Surface water	Watercourses having a WFD classification shown in a River Basin Management Plan (RBMP) and Q95 ≥ 1.0 m^3/s where Q95 is the flow in cubic metres per second which was equalled or exceeded for 95% of the surface water feature's flow record.
	Nationally significant attribute of high importance.	Groundwater	Principal aquifer providing a regionally important resource and / or supporting a site protected under European Commission (EC) and UK Biodiversity legislation. Groundwater locally supports GWDTE. SPZ1.
High	Human Health: high sensitivity land use.	Contamination	Construction workers (where limited earthworks are proposed). Public green space.
	Locally significant attribute of high importance.	Surface water	Watercourses having a WFD classification shown in a RBMP and Q95 < 1.0 m^3/s where Q95 is the flow in cubic metres per second which was equalled or exceeded for 95% of the surface water feature's flow record.

Receptor Value (Sensitivity)	Criteria	Typical Examples	
	Locally significant attribute of high importance.	Groundwater	Principal aquifer providing locally important resource or supporting a river ecosystem. Groundwater supports a GWDTE. SPZ2.
Medium	Human Health: medium sensitivity land use.	Contamination	Construction and maintenance workers (minimal disturbance of ground). Commercial or industrial properties.
	Of moderate quality and rarity	Surface water	Watercourses not having a WFD classification shown in a RBMP and Q95 >0.001 m^3/s where Q95 is the flow in cubic metres per second which was equalled or exceeded for 95% of the surface water feature's flow record.
	Of moderate quality and rarity	Groundwater	Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ3.
Low	Of local importance / interest with potential for replacement	Geology	Non designated geological exposures, former quarries / mining sites.
	Low sensitivity land use	Contamination	Construction and maintenance workers (where no disturbance of ground proposed). Infrastructure (roads, bridges, railways, buildings and services).
	Low sensitivity quality	Surface water	Watercourses not having a WFD classification shown in a RBMP and Q95 <0.001 m^3/s where Q95 is the flow in cubic metres per second which was equalled or exceeded for

Receptor Value (Sensitivity)	Criteria	Typical Examples	
			95% of the surface water feature's flow record.
	Low sensitivity quality	Groundwater	Unproductive strata.

Magnitude

16.8.15. The expected magnitude of impact to each identified receptor will be assigned in accordance with the principles established in Table 3.12 of the DMRB Sustainability & Environmental Appraisal, LA 109: Geology and Soils (**Ref 16.31**) and Table 3.4N of the DMRB Sustainability & Environmental Appraisal, LA 104: Environmental Assessment and Monitoring (**Ref 16.32**), along with professional judgement. The terms used to describe magnitude of impact are defined in **Table 16-8**.

Table 16-8: Classification of Magnitude of Impact (Change)

Magnitude of Impact (Change)		Definition
High	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements; exposure to acutely toxic contaminants.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality.
Medium	Adverse	Loss of resource, but not adversely affecting integrity; partial loss of/damage to key characteristics, features or elements; short term exposure to contaminants with chronic (long term) toxicity.
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Low	Adverse	Some measurable adverse change in attributes, quality or vulnerability; minor loss of, or alteration

Magnitude of Impact (Change)		Definition
		to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduce risk of negative impact occurring.
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Significance Criteria

16.8.16. Once the sensitivity of the affected receptor to change and the magnitude of change have been established, the matrix presented in **Table 16-9**, which is based on Table 3.8.1 of the DMRB Sustainability & Environmental Appraisal, LA 104: Environmental Assessment and Monitoring (**Ref 16.32**) will be used to determine the significance of effect, ranging from 'neutral' to 'critical'. The likely duration of the effect and likelihood of the effect occurring is also considered when assessing each effect.

16.8.17. 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 16-9: Significance of Effects Matrix

		Magnitude of Impact (Change)				
		No Change	Negligible	Low	Medium	High
Receptor Value (Sensitivity)	Very High	Neutral	Minor	Moderate or Major	Major or Critical	Critical
	High	Neutral	Minor	Minor or Moderate	Moderate or Major	Major or Critical
	Medium	Neutral	Neutral or Minor	Minor	Moderate	Moderate or Major
	Low	Neutral	Neutral or Minor	Neutral or Minor	Minor	Minor or Moderate

TEMPORAL SCOPE

16.8.18. The assessment of environmental effects relating to ground conditions and soils will comprise:

- Temporary effects, of short term (two to five years), and medium term (five to 10 years); and
- Permanent effects, of long term (10 to 15 years or more).

16.9. ASSESSMENT LIMITATIONS AND ASSUMPTIONS

16.9.1. The following limitations and assumptions have been identified:

- The assessment will rely on available data (e.g. obtained from site investigation, groundwater monitoring and gas monitoring), and reasonable endeavours will be made to ensure that the data is accurate and up to date. However, the accuracy of third-party information cannot be confirmed.
- Assessments will be limited by availability of design information, specifically in relation to site levelling, ground excavations, dredging, and below ground structures (i.e. depth of piles/foundations, finished floor levels). The composition and quantity of dredged arisings and the location of their disposal or potential for reuse will be confirmed as the design of the Proposed Scheme progresses, any impacts due to the reuse of dredged arisings will be considered accordingly within the PEIR and the ES.

16.10. REFERENCES

Ref 16.1: Department of Energy & Climate Change. (2011).'Overarching National Policy Statement for Energy (EN-1). Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 16.2: Department for Business, Energy and Industrial Strategy. (2021). 'Draft Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf

Ref 16.3: Ministry of Housing, Communities & Local Government. (2021). National Planning Policy Framework (NPPF). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf

Ref 16.4: The London Plan, The Spatial Development Strategy for Greater London. (2021). Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

Ref 16.5: London Borough of Bexley. (2012). Local Development Framework Plan Document Bexley Core Strategy. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Core-Strategy.pdf

Ref 16.6: Bexley Council. (2004). Unitary Development Plan. Available at: https://www.bexley.gov.uk/sites/default/files/2021-12/Bexley-unitary-development-plan-written-statement-2004.pdf

Ref 16.7: London Borough of Bexley. (2021). Draft Local Plan. Available at: https://www.bexley.gov.uk/sites/default/files/2021-10/Draft-local-plan-proposed-submission-document-reg-19-may-2021.pdf

Ref 16.8: Part 2A of the Environmental Protection Act. (1990). Available at: https://www.legislation.gov.uk/ukpga/1990/43/part/IIA

Ref 16.9: Health and Safety Executive. (2015). The Construction (Design and Management) Regulations 2015'. Available at: https://www.hse.gov.uk/construction/cdm/2015/index.htm (

Ref 16.10: Health and Safety Executive. (2002). Control of Substances Hazardous to Health 2002 (COSHH). Available at: https://www.hse.gov.uk/nanotechnology/coshh.htm

Ref 16.11: Health and Safety Executive. (2012). Control of Asbestos Regulations 2012'. Available at: https://www.hse.gov.uk/asbestos/regulations.htm

Ref 16.12: The Environmental Permitting (England and Wales) Regulations. (2016). Available at: https://www.legislation.gov.uk/uksi/2016/1154/contents/made

Ref 16.13: The Water Environment (Water Framework Directive) (England and Wales) Regulations. (2017). Available at: https://www.legislation.gov.uk/uksi/2017/407/contents/made

Ref 16.14: UK Government. (2014). 'The Water Act'. Available at: https://www.legislation.gov.uk/ukpga/2014/21/contents/enacted

Ref 16.15: Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government. (2021). 'National Planning Practice Guidance, Healthy and Safe Communities'. Available at: https://www.gov.uk/guidance/health-and-wellbeing

Ref 16.16: CIRIA. (2001). Contaminated Land Risk Assessment. A Guide to Good Practice (C552).

Ref 16.17: CIRIA. (2001). Control of Water Pollution from Construction Sites. Guidance for consultants and contractors (C532).

Ref 16.18: CIRIA. (2014). Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks (C733).

Ref 16.19: Environment Agency. (2021). Land Contamination Risk Management (LCRM). Available at: https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm

Ref 16.20: Society of Brownfield Risk Assessment (SoBRA). (2022). Guidance on Assessing Risk to Controlled Waters from UK Land Contamination Under Conditions of Future Climate Change. Available at: https://sobra.org.uk/?pmpro_getfile=1&file=2022/08/SoBRA-controlled-waters-and-climate-change-report-_-FINAL_published-issue_Aug-2022-1&ext=pdf

Ref 16.21: Environment Agency. (2017). Groundwater protection technical guidance'. Available at: https://www.gov.uk/government/publications/groundwater-protection-technical-guidance/groundwater-protection-technical-guidance

Ref 16.22: Groundsure. (2023). Groundsure Report and Historical maps, Order Ref.: GS-9317318, dated 25 January 2023.

Ref 16.23: British Geology Survey (BGS) Geology Online Viewer. Available at: https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/

Ref 16.24: BGS GeoIndex Onshore Online Viewer. Available at: https://www.bgs.ac.uk/map-viewers/geoindex-onshore/

Ref 16.25: Multi Agency Geographic Information for the Countryside (MAGIC) Map Application. Available at: https://magic.defra.gov.uk/magicmap.aspx

Ref 16.26: Google Earth. (2023). satellite imagery. Available at: https://earth.google.com/web/

Ref 16.27: WSP. (2023). Cory CCUS and Hydrogen Facility Preliminary Risk Assessment. Ref.: 70090329-PRA.

Ref 16.28: Guidance for the Safe Development of Housing on Land Affected by Contamination: R&D Publication 66. (2008). Available at: https://www.middevon.gov.uk/media/114549/volume-1-guidance-for-the-safe-development-of-housing-on-land-affected-by-contamination.pdf

Ref 16.29: The Environmental Permitting (England and Wales) Regulations. (2016). Available at: https://www.legislation.gov.uk/uksi/2016/1154/contents/made

Ref 16.30: International Organisation for Standardisation (ISO). (2021). ISO 14001:2015 Environmental management systems – Requirements with guidance for use (2021).

Ref 16.31: Highways England. (2019). Design Manual for Roads and Bridges (DMRB) Sustainability & Environment Appraisal: LA 109 – Geology and soils. Available at: https://www.standardsforhighways.co.uk/dmrb/search/adca4c7d-4037-4907-b633-76eaed30b9c0

Ref 16.32: Highways England. (2020). Design Manual for Roads and Bridges (DMRB) Sustainability & Environment Appraisal: LA 104 – Environmental assessment and monitoring. Available at: https://www.standardsforhighways.co.uk/prod/attachments/0f6e0b6a-d08e-4673-8691-cab564d4a60a?inline=true

17. LANDSIDE TRANSPORT

17.1. INTRODUCTION

17.1.1. This chapter considers the likely impacts of the Proposed Scheme on Landside Transport during construction and operation, and any potential significant effects. It sets out the proposed methodology for the Landside Transport assessment and identifies those impacts that can be scoped out of the assessment. Where necessary, further assessment will be presented in the ES and accompanying Transport Assessment (TA).

17.2. POLICY AND GUIDANCE

17.2.1. The policy and guidance relevant to the assessment of the Proposed Scheme is detailed in **Table 17-1**.

Table 17-1: Landside Transport – Summary of Key Policy and Guidance

Policy / Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2011 (Ref 17.1)	Outlines that the transport of materials, goods and personnel to and from a development during all phases can have a variety of impacts on the surrounding transport infrastructure. This NPS states that these should be assessed in a TA and where applicable, appropriate mitigation measures should be proposed.
Draft Overarching National Policy Statement for Energy EN-1 2021 (Ref 17.2)	For Landside Transport the 2021 Draft NPS EN-1 is largely the same as in the 2011 document.
National Planning Policy Framework (NPPF) 2021 (Ref 17.3)	Presents the Government's planning policies for England and how these should be applied, with a presumption in favour of sustainable development. 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 / Guidance	Description
The London Plan 2021 (Ref 17.4)	The London Plan is the overarching strategic plan for London, presenting an integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years. 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.
London Borough of Bexley Core Strategy 2012 (Ref 17.5)	The Core Strategy sets out a spatial planning framework for the Borough until 2026. The Core Strategy will be replaced by the new Local Plan once it is adopted. Relevant policies include: • Policy CS15: Achieving an Integrated and Sustainable Transport System; and • Policy CS16: Reducing the Need to Travel and the Impact of Travel.
London Borough of Bexley Unitary Development Plan (UDP) 2004 – 'Saved' Policies (Ref 17.6)	The main purpose of the Unitary Development Plan is to provide a framework for guiding development, and to show how land will be used as a resource for achieving the Council's wider objectives. The 'saved' policies of relevance to Landside Transport include: • Policy T6: Optimising Use of the Existing Transport Network; and • Policy T17: Provision of Off-street Parking.

Policy / Guidance	Description
London Borough of Bexley Draft Local Plan 2021 (Ref 17.7)	The new Local Plan is awaiting adoption and will then replace the Bexley Core Strategy and Saved Unitary Development Plan (UDP) policies 2012. Chapter 6 in the new Local Plan identifies policies that seek to ensure that sufficient provision is made for infrastructure required for growth in the Borough. Relevant policies include: • SP10: Bexley's Transport Network; • DP22: Sustainable Transport; and • DP24: Impact of new development on the transport network.
Decarbonising Transport: A Better, Greener Britain 2021 (Ref 17.8)	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 (Ref 17.9)	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.
Local Transport Plan (LTP) 4: Delivering Growth without Gridlock 2016-2031 2016 (Ref 17.10)	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. 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

Policy / Guidance	Description
	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 are likely to use part of the highway network maintained by KCC as the local highway authority.
Dartford Development Policies Plan 2017 (Ref 17.11)	This Plan replaces the remaining parts of the 1995 Borough Local Plan and sets out the main planning policies that Dartford Borough Council (DBC) will use to assess planning applications, supporting their adopted Core Strategy (2011). 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 local planning authority (LPA).
Guidance	
National Planning Policy Guidance (2021) (Ref 17.12)	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 Road Traffic 1993 (Ref 17.13)	These Guidelines provide the basis for a systematic, consistent and comprehensive coverage for the appraisal of traffic impacts for a wide range of development projects. The Guidelines are for the assessment of the environmental impact of road traffic associated with major new developments and are intended to complement professional judgement.

17.3. BASELINE CONDITIONS AND FUTURE BASELINE

17.3.1. The key sources of information on baseline Landside Transport conditions will be:

- Desktop review, supplemented by a site visit, to establish existing:
  - pedestrian routes / access to local services and facilities;
  - cycle routes / access to local services and facilities;
  - bus services and associated infrastructure / facilities; and
  - highway network characteristics, including highway safety records (data to be obtained from the Local Highway Authorities).
- Survey data:
  - Traffic volumes and queues on the existing transport and highway network: a series of traffic surveys including, Automatic Traffic Counts (ATC), Manual Classified Counts (MCC) and queue length surveys will be undertaken, particularly at junctions where significant increases in vehicle movements are anticipated as a result of the Proposed Scheme during the construction and operation phases. The traffic surveys will be carried out by WSP in 2023, providing a snapshot of the traffic conditions within the local area.
  - Non-Motorised User (NMU) counts: information where available will be sought from local highway authorities (LBB, KCC, National Highways (NH) and Transport for London (TfL)) to determine usage of adjacent footways, cycleways and Public Rights of Way (PRoW). If required, additional surveys will be undertaken by WSP in 2023, providing a snapshot of the usage of the NMU network within the local area.
  - Engagement will be undertaken with the local highway authorities to agree the extent of surveys required.

17.3.2. The information gathered and presented within the ES for Riverside 2 will inform the baseline relevant to landside transport, where relevant.

17.3.3. A short summary of the baseline conditions is presented below.

EXISTING BASELINE

Access and Location

17.3.4. Riverside 1, including Middleton Jetty, the foreshore of the River Thames and Belvedere Power Station Jetty (disused jetty) located to the north of the Iron Mountain Records Storage Facility are situated to the north of the site. To the south 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.

17.3.5. The main access route to the Site is Norman Road, located off the A2016 Picardy Manorway.

17.3.6. Further information and details on the facilities within the Site Boundary, destinations, surrounding PRoW and the surrounding area are described **Chapter 2: Site and Proposed Scheme Description**.

Highway Network

17.3.7. 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.

17.3.8. Norman Road has a footway which runs 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.

17.3.9. 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.

17.3.10. 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 330m to the southeast; both in the form of large, priority roundabouts.

17.3.11. The A2016 Eastern Way forms part of the Strategic Road Network (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.

17.3.12. London's Ultra Low Emission Zone (ULEZ) is expanding 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).

17.3.13. 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.

17.3.14. 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.

FUTURE BASELINE

17.3.15. Future baseline Landside Transport conditions will be established in conjunction with the local highway authorities. It is anticipated that the future baseline will incorporate:

- the operation of Riverside 2;
- background traffic growth;
- traffic flows associated with committed development schemes (aligning with those identified for the cumulative effects assessment – further details are provided in **Chapter 20: Cumulative Effects**), including Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken); and
- committed transport improvement schemes.

17.4. STUDY AREA

17.4.1. 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 as a result of the construction and operation of the Proposed Scheme.

17.4.2. The construction and operation phase Study Area for Landside Transport will be dependent upon pre-application discussions held with the local highway authorities. It is expected that the Study Area will include the key links from the Site Boundary to the surrounding local and strategic road network that would be subject to daily traffic flow changes as a result of the construction or operation of the Proposed Scheme. The key links are likely to include:

- Norman Road;
- Yarnton Way;
- B253 Picardy Manorway;
- A2016 Picardy Manorway/Eastern Way/Bronze Age Way;
- A2000 Perry Street;
- A2026 Burnham Road; and
- A206.

17.5. SENSITIVE RECEPTORS / RESOURCES

17.5.1. 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.

17.5.2. Construction and operation phase vehicles associated with the Proposed Scheme are likely to utilise the surrounding dual-carriageways to access the Proposed Scheme (Yarnton Way, A2016 Picardy Manorway/Eastern Way/Bronze Age Way and the A206). These surrounding dual-carriageways are not fronted by residential areas and as such residents are not considered to be a sensitive receptor with regards to Landside Transport.

17.5.3. The future baseline for the Proposed Scheme will include the operation of Riverside 2.

17.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION PHASE

17.6.1. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- Construction Traffic Management Plan (CTMP): this would sit either as an appendix to, or alongside the Code of Construction Practice (CoCP) and set out measures to mitigate construction effects including 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 CTMP will be produced in accordance with local highway authority guidance.

OPERATION PHASE

17.6.2. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- Workplace Travel Plan (WTP): the operation of the Carbon Capture and Storage Project is not anticipated to attract any vehicular movements (with the exception of occasional maintenance vehicles), therefore only the operational impact of the Hydrogen Project will be considered. 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 of the Hydrogen Project to travel by more sustainable and active transport options.

17.6.3. The anticipated operational trip attraction associated with the Proposed Scheme is not likely to require significant mitigation or enhancements to the surrounding local and strategic road network.

17.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

17.7.1. The potential likely significant effects associated with the construction phase include:

- increased pedestrian and / or cyclist severance and delay;
- increased fear and intimidation;
- reduced pedestrian and /or cyclist amenity;
- adverse effects to the public transport network; and
- increased driver delay, increased accidents and reduced safety.

OPERATION PHASE

17.7.2. The potential likely significant effects associated with the operation phase include:

- increased pedestrian and / or cyclist severance and delay;
- increased fear and intimidation;
- reduced pedestrian and / or cyclist amenity;
- adverse effects to the public transport network; and
- increased driver delay, increased accidents and reduced safety.

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

17.7.3. The impacts scoped in or out for the Landside Transport assessment are as set out in **Table 17-2**:

Table 17-2: Landside Transport - Impacts Scoped in or Out of Further Assessment

Impacts	Phase	Scoped In	Scoped Out	Justification
Pedestrian / cyclist severance	Construction and Operation	✓		Given the proximity of (and in some cases the inclusion within) the Site Boundary to several PRoWs, footways and cycleways, the impact of the Proposed Scheme on pedestrian/cyclist severance will be scoped into the assessment. The assessment of pedestrian/cyclist severance is also required by the Guidelines for the Environmental Assessment of Road Traffic (**Ref 17.13)**.
Pedestrian / cyclist delay	Construction and Operation	✓		Given the proximity of (and in some cases the inclusion within) the Site Boundary to several PRoWs, footways and cycleways, the impact of the Proposed Scheme on pedestrian/cyclist delay will be scoped into the assessment. The assessment of pedestrian/cyclist delay is also required by the Guidelines for the Environmental Assessment of Road Traffic (**Ref 17.13)**.
Pedestrian / cyclist amenity	Construction and Operation	✓		Given the proximity of (and in some cases the inclusion within) the Site Boundary to several PRoWs, footways and cycleways, the impact of the Proposed Scheme on pedestrian/cyclist amenity will be scoped into the assessment. The assessment of pedestrian/cyclist amenity is also required by the Guidelines for the Environmental Assessment of Road Traffic (**Ref 17.13)**.

Impacts	Phase	Scoped In	Scoped Out	Justification
Fear and intimidation	Construction and Operation	✓		Given the proximity of (and in some cases the inclusion within) the Site Boundary to several PRoWs, footways and cycleways, the impact of the Proposed Scheme on fear and intimidation will be scoped into the assessment. The assessment of fear and intimidation is also required by the Guidelines for the Environmental Assessment of Road Traffic (**Ref 17.13)**.
Public transport network	Construction and Operation	✓		Given the proximity of the Site Boundary to local bus stops (A2016 Picardy Manorway) and Belvedere Railway Station, the impact of the Proposed Scheme on the public transport network will be scoped into the assessment. The assessment of potential impacts to the public transport network is also required by the Guidelines for the Environmental Assessment of Road Traffic (**Ref 17.13)**.
Driver delay	Construction and Operation	✓		The Proposed Scheme will result in additional vehicles (both light and HGVs) on the highway network across a daily period during construction. The operation of the Carbon Capture and Storage Project is not anticipated to attract any vehicular movements (with the exception of occasional maintenance vehicles), therefore only the operational impact of the Hydrogen Project will be considered (if this transport option is chosen). The impact of the Proposed

Impacts	Phase	Scoped In	Scoped Out	Justification
				Scheme on driver delay at junctions (agreed with the LHAs) will be scoped into the assessment. The assessment of driver delay is also required by the Guidelines for the Environmental Assessment of Road Traffic (**Ref 17.13)**.
Accidents and Safety	Construction and Operation	✓		The Proposed Scheme will result in additional vehicles (both light and HGVs) on the highway network across a daily period. As such, the impact of the Proposed Scheme on accidents and safety will be scoped into the assessment. The assessment of accidents and safety is also required by the Guidelines for the Environmental Assessment of Road Traffic (**Ref 17.13)**.
Hazardous Loads	Operation		✓	The Proposed Scheme is not anticipated to generate any landside hazardous loads and as such, the transportation of hazardous loads and the associated impact has been scoped out of further assessment.

17.8. PROPOSED ASSESSMENT METHODOLOGY

17.8.1. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with LBB and the EA.

17.8.2. The key sources of baseline information (outlined in **Section 17.3**) will provide an understanding of the existing transport conditions and flow of traffic. The assessment of Landside Transport will include three future baseline years: a 'peak construction' year - aligning with peak construction activities (i.e. when both the Carbon Capture and Storage Project train 1 and the Hydrogen Project are being commissioned, and Carbon Capture and Storage Project train 2 undergoing construction), a 'future year' (opening year), and a 'design year' (5-years post opening).

17.8.3. These assessment years will be prepared by applying growth factors to the baseline traffic flows (outlined in **Section 17.3**), obtained from the Trip End Model Presentation Program (TEMPro) v7.2 – adjusted to the National Transport Model (NTM) dataset AF15.

17.8.4. In addition, to complete the future baseline years traffic flow information, traffic flows associated with committed developments will be included where relevant. The committed developments will, where relevant, align with those identified for the cumulative effects assessment (further details are provided in **Chapter 20: Cumulative Effects**).

17.8.5. The transport datasets will inform the TA which will 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 junctions that are identified as being under stress and/or where significant increases in vehicle movements are anticipated.

17.8.6. The approach to the TA will be discussed, and agreement sought, with the local highway authorities.

17.8.7. Further details on the TA for both the construction and operation phases alongside each of the impacts proposed to be scoped in are provided below.

CONSTRUCTION PHASE

17.8.8. The construction phase assessment will be undertaken in line the IEMA Guidelines (**Ref 17.13**). The assessment will evaluate the Landside Transport conditions during a 'peak construction' year.

17.8.9. The construction phase assessment will include:

- construction traffic volume (Heavy Goods Vehicles (HGVs) 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).

17.8.10. Capacity assessments will be undertaken at the junctions for the 'peak construction' year - aligning with peak construction activities (i.e. when both the Carbon Capture and Storage Project train 1 and the Hydrogen Project are being commissioned, and Carbon Capture and Storage Project train 2 undergoing construction). These junctions will be agreed with the local highway authorities.

OPERATION PHASE

17.8.11. The operation phase assessment will be undertaken in line the IEMA Guidelines (**Ref 17.13**). The operation phase assessment will evaluate the Landside Transport conditions for the 'future year' and 'design year'.

17.8.12. The operation phase assessment will include:

- operation traffic volume (HGVs and light vehicles);
- proxy traffic volumes for committed developments, including Riverside 2;
- anticipated vehicle routing during operation; and
- journey to work data (obtained from the latest available Census data).

17.8.13. Capacity assessments will be undertaken at the junctions for the 'future year' and 'design year'. These junctions will be agreed with the local highway authorities.

SIGNIFICANCE OF EFFECT CRITERIA

17.8.14. As described at **Chapter 3: EIA Methodology**, the methodology for assessing the significance of an effect will be based on the environmental sensitivity (or value/importance) of a receptor and the magnitude of change from baseline conditions.

17.8.15. The approach to determining the sensitivity of receptors, magnitude of impacts and the significance of effects considered for the impacts identified in **Table 17-2** and required by the IEMA Guidelines (**Ref 17.13**) is described below.

Pedestrian and Cyclist Severance

17.8.16. Professional judgement will be applied to determine receptor sensitivity. The IEMA Guidelines (**Ref 17.13**) 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, 60% as 'moderate' impact and 90% as 'substantial' impact. These indicators, together with specific local conditions (such as the provision of crossing facilities and traffic signal settings) will be used to determine the magnitude of impact on severance.

17.8.17. Together the sensitivity of the receptor and magnitude of the impact will be used to determine the significance of effect, as described at **Chapter 3: EIA Methodology**.

Pedestrian and Cyclist Delay

17.8.18. There is no formal or published guidance for the assessment of pedestrian and cyclist delay. However, the IEMA Guidelines (**Ref 17.13**) recommend assessors use their professional judgement to determine the significance of effect by considering both the sensitivity of the receptor and magnitude of the impact. 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.

17.8.19. Together the sensitivity of the receptor and magnitude of the impact will be used to determine the significance of effect, as described at **Chapter 3: EIA Methodology**.

Pedestrian and Cyclist Amenity

17.8.20. Professional judgement will be applied to determine receptor sensitivity. The IEMA Guidelines (**Ref 17.12**) suggest a 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 to be 'high' where traffic flow has doubled and 'low' where traffic flow has halved.

17.8.21. Together the sensitivity of the receptor and magnitude of the impact will be used to determine the significance of effect, as described at **Chapter 3: EIA Methodology**.

Fear and Intimidation

17.8.22. 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 (**Ref 17.13**) recommends the thresholds outlined in **Table 17.3** are used to assess the magnitude of effect on fear and intimidation.

17.8.23. Considerations key to assessing the impact on fear and intimation include: volume of traffic; percentage of HGVs; 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.

Table 17-3: Landside Transport - Fear and Intimidation (Ref 17.13)

Degree of hazard	18-hour average flow (vehicle / hour)	18-hour total HGV flow	18-hour average speed change (mph)
Extreme	1,800+	3,000+	20+
Great	1,200-1,800	2,000-3,000	15-20
Moderate	600-1,200	1,000-2,000	10-15

17.8.24. ‘Extreme’ hazards would constitute ‘high’ magnitudes of change; ‘great’ hazards would be classed as ‘medium’ magnitudes of change; and ‘moderate’ hazards would be classed as ‘low’ magnitude of change.

17.8.25. Together the sensitivity of the receptor and magnitude of the impact will be used to determine the significance of effect, as described at **Chapter 3: EIA Methodology**.

Public Transport Network

17.8.26. 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 will be 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.

17.8.27. Together the sensitivity of the receptor and magnitude of the impact will be used to determine the significance of effect, as described at **Chapter 3: EIA Methodology**.

Driver Delay

17.8.28. To determine the traffic and transport impact of the Proposed Scheme on driver delay, junctions (to be agreed with the local highway authorities) on the local and strategic highway network will be modelled using appropriate junction assessment software (LinSig, ARCADY and PICADY) with and without the Proposed Scheme for the three future baseline years: a ‘peak construction’ year - aligning with peak construction activities (i.e. when both the Carbon Capture and Storage Project train 1 and the Hydrogen Project are being commissioned, and Carbon Capture and Storage Project train 2 undergoing construction), a ‘future year’ (opening year), and a ‘design year’ (5-years post opening).

17.8.29. These models will provide an assessment of the Ratio of Flow to Capacity (RFC), or Degree of Saturation (DoS) (in the case of signalised junctions), the expected level of queuing and average delay per vehicle at each junction approach during peak highway time periods. The magnitude of impact on driver delay will be based on the percentage change in average driver delay per vehicle. The percentage thresholds for low, medium and high magnitude impact will be based on IEMA Guidelines (**Ref 17.13**) thresholds of 30%, 60% and 90% respectively. The receptor sensitivity will be determined using professional judgement.

17.8.30. Together the sensitivity of the receptor and magnitude of the impact will be used to determine the significance of effect, as described at **Chapter 3: EIA Methodology**.

Accidents and Safety

17.8.31. The assessment of accident risk and highway safety is based upon existing accident rates and specific local circumstances to identify accident clusters. For example, should a particular link or junction be found to have a high existing accident rate, 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.

17.8.32. A further assessment of highway safety may include the comparison of accident rates at those locations identified for highway improvements related to capacity issues. An assessment of expected accident rates for a new junction design compared to the existing layout would identify future accident risk related to development-generated traffic.

17.8.33. The IEMA Guidelines (**Ref 17.13**) 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"*.

17.8.34. A review of accidents occurring over the most recent three-year period within the area surrounding the Site Boundary will be undertaken to identify existing accident clusters, i.e. where 10 or more accidents occurred over the three-year period. This review will determine the sensitivity of the receptor.

17.8.35. The criteria used to determine the magnitude of the impact to be applied to accidents and road safety is described by **Table 17-4** below. The criteria are in accordance with the IEMA Guidelines (**Ref 17.13**).

Table 17-4: Accidents and Road Safety: Magnitude of Effect (Ref 17.13)

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.

17.8.36. Together the sensitivity of the receptor and magnitude of the impact will be used to determine the significance of effect, as described at **Chapter 3: EIA Methodology**.

17.9. ASSESSMENT LIMITATIONS AND ASSUMPTIONS

17.9.1. The following limitations and assumptions have been identified:

- The proposed methodology will utilise available information and conform to the requirements of local and national guidance and planning policy.
- The assessment will be undertaken with information available at the time of writing, from various sources: documentary sources, cartographic evidence, evidence from traffic surveys and evaluation of results from detailed transport analysis.
- The assessment of transport conditions will utilise traffic surveys carried out by WSP in 2023, which will provide a snapshot of the traffic conditions within the local area.The estimation of construction and operational trips will be informed by the design team as the EIA process progresses.
- It is assumed that the peak construction year would align with the peak construction activities (i.e. when both the Carbon Capture and Storage Project train 1 and the Hydrogen Project are being commissioned, and Carbon Capture and Storage Project train 2 undergoing construction).
- It is assumed that HGVs would access the Site via the A282/M25, A206, A2016 and Norman Road and that this will be required through the CTMP (to be secured by DCO requirement).

17.10. REFERENCES

Ref 17.1: Department of Energy and Climate Change. (2011). 'National Policy Statement for Energy EN-1'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 17.2: Department for Business, Energy and Industrial Strategy. (2021). 'Draft Overarching National Policy Statement for Energy EN-1'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 17.3: Ministry of Housing, Communities and Local Government. (2021). 'National Planning Policy Framework'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf

Ref 17.4: Mayor of London. (2021). 'The London Plan'. Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

Ref 17.5: London Borough of Bexley. (2012). 'Core Strategy 2012'. Available at: https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Core-Strategy.pdf

Ref 17.6: London Borough of Bexley. (2004). 'Unitary Development Plan'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-12/Bexley-unitary-development-plan-written-statement-2004.pdf

Ref 17.7: London Borough of Bexley. (2022). 'Draft Local Plan'. Available at: https://www.bexley.gov.uk/services/planning-and-building-control/planning-policy/local-plan-review

Ref 17.8: Department for Transport. (2021.) 'Decarbonising Transport: A Better, Greener Britain 2021'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1009448/decarbonising-transport-a-better-greener-britain.pdf

Ref 17.9: Transport for London. (2018). 'Major's Transport Strategy 2018'. Available at: https://tfl.gov.uk/corporate/about-tfl/the-mayors-transport-strategy

Ref 17.10: Kent County Council. (2016). 'Local Transport Plan (LTP) 4: Delivering Growth without Gridlock 2016-2031'. Available at: https://www.kent.gov.uk/__data/assets/pdf_file/0011/72668/Local-transport-plan-4.pdf

Ref 17.11: Dartford Borough Council (2017). 'Dartford Development Polices Plan 2017'. Available at: https://www.dartford.gov.uk/downloads/download/1405/dp-plan-final-version-for-adoption-for-web

Ref 17.12: Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government. (2021). 'National Planning Practice Guidance, Healthy and Safe Communities'. Available at: https://www.gov.uk/guidance/health-and-wellbeing

Ref 17.13: IEMA. 'Guidelines for the Environment Assessment of Road Traffic'. (1993). Available at: https://gat04-live-1517c8a4486c41609369c68f30c8-aa81074.divio-media.org/filer_public/dc/df/dcdfa287-b475-4fbb-bd4e-a1e96b06be5d/cd71-guideline-for-the-environmental-assessment-of-road-traffic-institute-of-environmental.pdf

18. MARINE NAVIGATION

18.1. INTRODUCTION

18.1.1. This chapter considers the impacts of the Proposed Scheme on marine navigation during construction and operation and any potential significant effects. It sets out the proposed methodology for the marine navigation assessment and identifies those impacts that can be scoped out of the assessment. Where necessary further assessment will be presented in the ES.

18.2. POLICY, LEGISLATION, AND GUIDANCE

18.2.1. The policy and guidance relevant to the assessment of the Proposed Scheme on marine navigation is shown in shown in **Table 18-1**. The National Planning Policy Framework (NPPF) 2021 (**Ref 18.1**), London Borough of Bexley Core Strategy 2012 (**Ref 18.2**), London Borough of Bexley Draft Local Plan 2021 (**Ref 18.3**) and the National Planning Practice Guidance (2016) (**Ref 18.4**) have been excluded from **Table 18-1** due to a lack of specific policies and guidance relating to marine navigation. There is no legislation relevant to the assessment.

Table 18-1: Marine Navigation – Summary of Key Policy and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement for Energy EN-1 2011 (Ref 18.5)	NPS EN-1 sets out the Government's policy for delivery of major energy infrastructure and will be the primary basis for decision making. Overarching NPS EN-1 does not specifically refer to shipping and navigation, but the overarching guidance principles of NPS EN-1 will be considered.
Draft Overarching National Policy Statement for Energy EN-1 2021 (Ref 18.6)	The Government has published a draft update to the Overarching National Policy Statement for Energy. The Draft Overarching NPS EN-1 does not specifically refer to shipping and navigation, but the overarching guidance principles of the Draft NPS EN-1 will be considered.
The London Plan 2021 (Ref 18.7)	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 / Legislation / Guidance	Description
	There are a number of sections which cover the use of the river and hoe it can be used for overall development.
London Borough of Bexley Unitary Development Plan (UDP) 2004 (Ref 18.8)	The main purpose of the Unitary Development Plan is to provide a framework for guiding development, and to show how land will be used as a resource for achieving the Council's wider objectives. Policy TAL12 includes reference to activities taking place on the River Thames must be "compatible with the safety of navigation and the Port of London Authority (PLA) should be consulted on any proposals for such activities".
Pilotage Directions 2017 (Ref 18.59)	Document produced by the PLA to inform all masters, pilots, and crew operating within the Port of London of the rules, regulations, standards, and protocols for doing so.
Legislation	
Pilotage Act 1987 (Ref 18.11)	An Act of Parliament to make new provision in respect of pilotage.
Merchant Shipping Act 1995 (Ref 18.12)	An Act of Parliament to consolidate the Merchant Shipping Acts 1894 to 1994 and other enactments relating to merchant shipping.
Guidance	
Marine Guidance Note (MGN) 654 Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response 2021 (Ref 18.13)	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.
Methodology for Assessing the Marine Navigational Safety Risks and Emergency Response of Offshore	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 and is applicable

Policy / Legislation / Guidance	Description
Renewable Energy Installations 2021 (Ref 18.14)	to other types of development such as the Proposed Scheme.
International Association of Lighthouse Authorities (IALA) Recommendations O-139 on the Marking of Man-Made Structures 2013 (Ref 18.15)	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.
Revised Guidelines for Formal Safety Assessment (FSA) for use in the International Maritime Organisation (IMO) Rule-Making Process 2018 (Ref 18.16)	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 2022 (Ref 18.17)	Produced by the PLA to showcase current action plans for the future, and highlight the methods, actions and initiatives that the authority will be takin gas it moves into the future.
Future Trade through the Port of London 2021 (Ref 18.18)	Report produced by Oxford Economics for the PLA which produces forecasts of the cargo currently and expected to be handles in the Port of London up to 2050 and identifies opportunities and challenges for the PLA and stakeholders.
Risk Assessment Methodology (Undated) (Ref 18.19)	High level initial overview of the risk assessment process and example of how such risk assessment can be undertaken.
Port Marine Safety Code 2016 (Ref 18.20)	Document outline 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.

18.3. BASELINE CONDITIONS AND FUTURE BASELINE

18.3.1. A preliminary baseline study has been undertaken by NASH Ltd to inform this Scoping Report. This section summarises the key navigational features in proximity to the Proposed Scheme within Halfway Reach, Bexley and as labelled on **Figure 18-1: Key Navigational Features**.

18.3.2. 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 the 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.

18.3.3. The NRA undertaken to support the ES for Riverside 2 concluded that there would be minimal impact upon navigational safety as a result of the additional REP vessel traffic. Given the resultant risk scores from the NRA, no additional risk controls would be proposed beyond those which are currently in effect on the River Thames.

18.3.4. The information gathered and presented within the ES for Riverside 2 will inform the baseline relevant to marine navigation, where relevant.

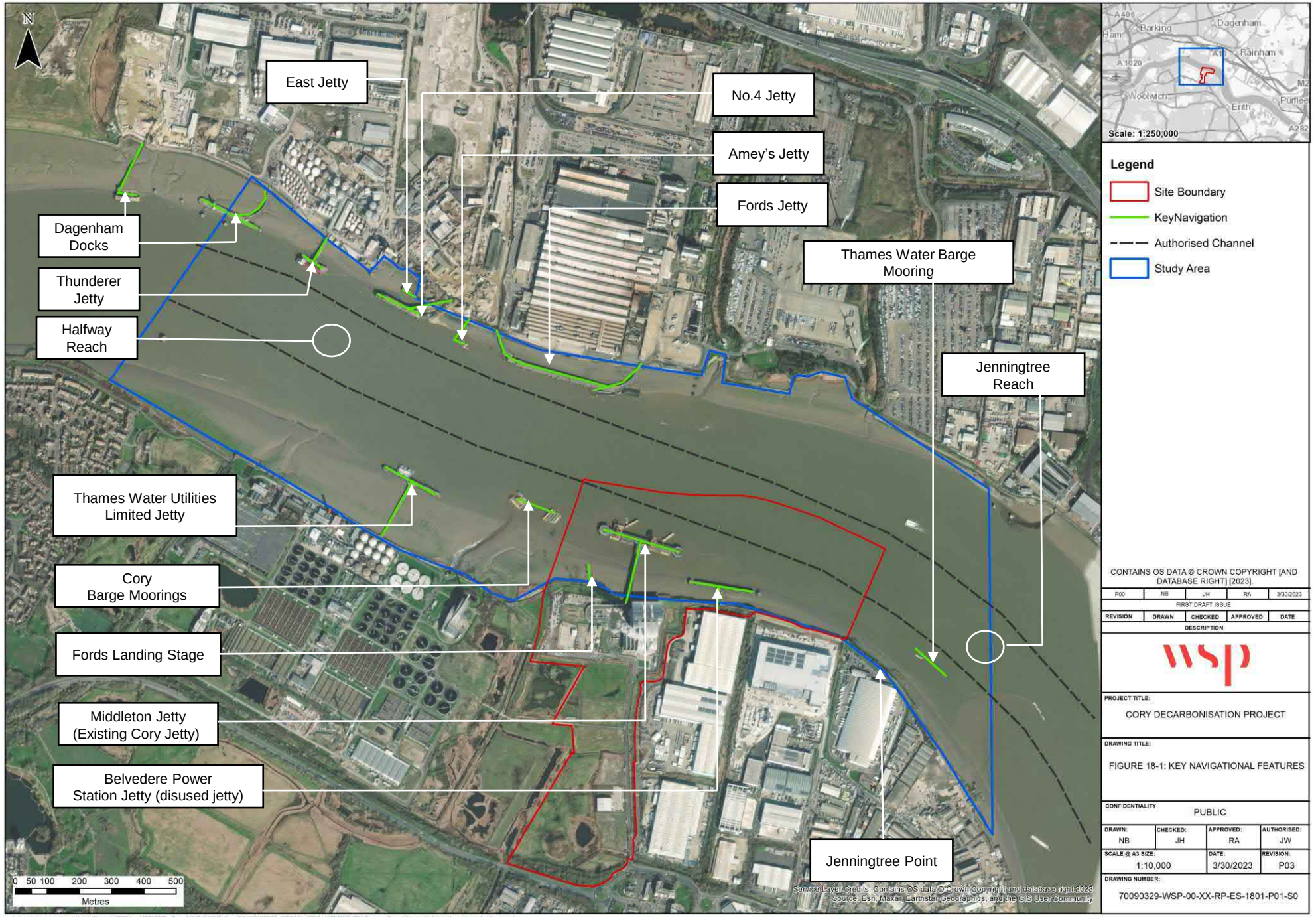
KEY NAVIGATIONAL FEATURES

18.3.5. The Key Navigational Features within the Study Area (described in **Section 18.4** below) are shown on **Figure 18-1: Key Navigational Features**.

- **Belvedere Power Station Jetty (Disused)**: This jetty, now in a state of disrepair, served as a transhipment facility for vessels supplying fuel to the former Belvedere Power Station. Fuel to Belvedere, as with many other Thames power stations at that time, was transhipped black oil from Shellhaven or Coryton refineries (lower Thames Canvey Island area) or from storage at Littlebrook power station (immediately above what is now M25 Dartford Queen Elizabeth II Bridge). The jetty lies within the intertidal zone approximately 2.1m above Chart Datum (CD) and therefore presents a limited hazard to navigation as it is only possible for vessels of shallow draught to navigate in the vicinity of the jetty near high water. In order for the Proposed Jetty to be constructed, the Belvedere Power Station Jetty would need to be fully decommissioned and dismantled.
- **Middleton Jetty**: This jetty serves as a transhipment facility for the Applicant's energy from waste facilities. Tugs and barges collect waste from waste transfer stations located at Wandsworth (Smugglers Way), Battersea (Cringle Dock), City of London (Walbrook Wharf) and Tower Hamlets (Northumberland Wharf). Future (from 2025 onwards) waste deliveries will also be made from Barking (Rippleway Wharf). Ash produced as a by-product is also shipped from this jetty to a treatment facility at the Port of Tilbury. Currently, there are approximately five tug and barge arrivals and five departures a day, which will increase with Riverside 2 becoming operational in 2026 (at the time of writing, construction works for Riverside 2 are being undertaken). Eights barges can be moored (utilising the river and shore facing sides of this jetty) alongside Middleton Jetty at any one time. The least

depth on the river facing side of this jetty is 1.4m, with the least depth on the inshore side at 0.7m.

- **Fords Landing Stage**: Fords Landing Stage is located inshore and west of Middleton Jetty. It is disused and is located within the intertidal zone approximately 3.1m above CD.
- **Cory Barge Moorings** : The barge moorings are utilised by the Applicant as a temporary location to moor either full or laden barges waiting to be transferred to Riverside 1 or onto waste transfer stations along the River Thames. There are frequent vessel movements by the Applicant's tugs and barges between the barge moorings and Riverside 1. The Applicant plans to increase the number of moorings in proximity to Middleton Jetty to accommodate the additional barges required to support the operation of Riverside 2, due by 2026. At the time of writing, the location of these moorings remain under consideration with proposed locations including: a site west of, and in line with, the Barge Moorings; and a site at Thamesmead. This will be considered further at PEIR and ES stage.
- **Crossness Sewage Treatment Works Jetty:** Owned by Thames Water Utilities Ltd, this jetty serves as an operational base for the vessels *Thames Bubbler* and *Thames Vitality.* These vessels pump oxygen into the River Thames at times when oxygen levels within the river decrease as a result of heavy surface water and storm water runoff. A number of smaller anti-pollution craft are also operated from this jetty.
- **Ford's Jetty**: This jetty is located on the north side of the River Thames (Dagenham) and is an important export facility for the Ford of Britain subsidiary of Ford Motor Company. Roll on-Roll off (Ro-Ro) cargo vessels such as *Wilhelmine* run a continuous loop between Dagenham and other Ford Motor Company locations in Vlissingen, Holland, transporting approximately 290,000 vehicles across the North Sea each year. There are, on average, eight arrivals and departures a month from this Jetty.
- **Amey's Jetty**: This jetty is serviced by GPS Marine tugs and barges operating an intra port aggregate transportation service. Arrivals and departure occur on a daily basis.
- **East Jetty:** This jetty is connected to the Van Dalen Scrap Yard and situated inshore of No. 4 Jetty (below). It is used for multiple cargo types.
- **No. 4 Jetty:** This jetty is linked to the Hansen Packed Products site, which stores and supplies construction materials. It is linked to land via a bridge and a conveyor structure. No.4 Jetty is serviced by GPS marine tugs and barges but is also used as a facility to unload Hanson Aggregates dredgers that operate in the Thames Estuary. Dredger vessels visit approximately once a week with tug and barge arrivals occurring on a more regular basis.
- **Thames Water Utilities Ltd Barge Moorings**: Two mooring buoys situated south of the Jenningtree channel marker and marked with a yellow light, flashing twice every 5 seconds.



Legend

- Site Boundary
- KeyNavigation
- Authorised Channel
- Study Area

REVISION	DRAWN	CHECKED	APPROVED	DATE
P00	NB	JH	RA	3/30/2023

DESCRIPTION: FIRST DRAFT ISSUE

PROJECT TITLE: CORY DECARBONISATION PROJECT

DRAWING TITLE: FIGURE 18-1: KEY NAVIGATIONAL FEATURES

CONFIDENTIALITY: PUBLIC

DRAWN:	CHECKED:	APPROVED:	AUTHORISED:
NB	JH	RA	JW

SCALE @ A3 SIZE:	DATE:	REVISION:
1:10,000	3/30/2023	P03

DRAWING NUMBER: 70090329-WSP-00-XX-RP-ES-1801-P01-S0

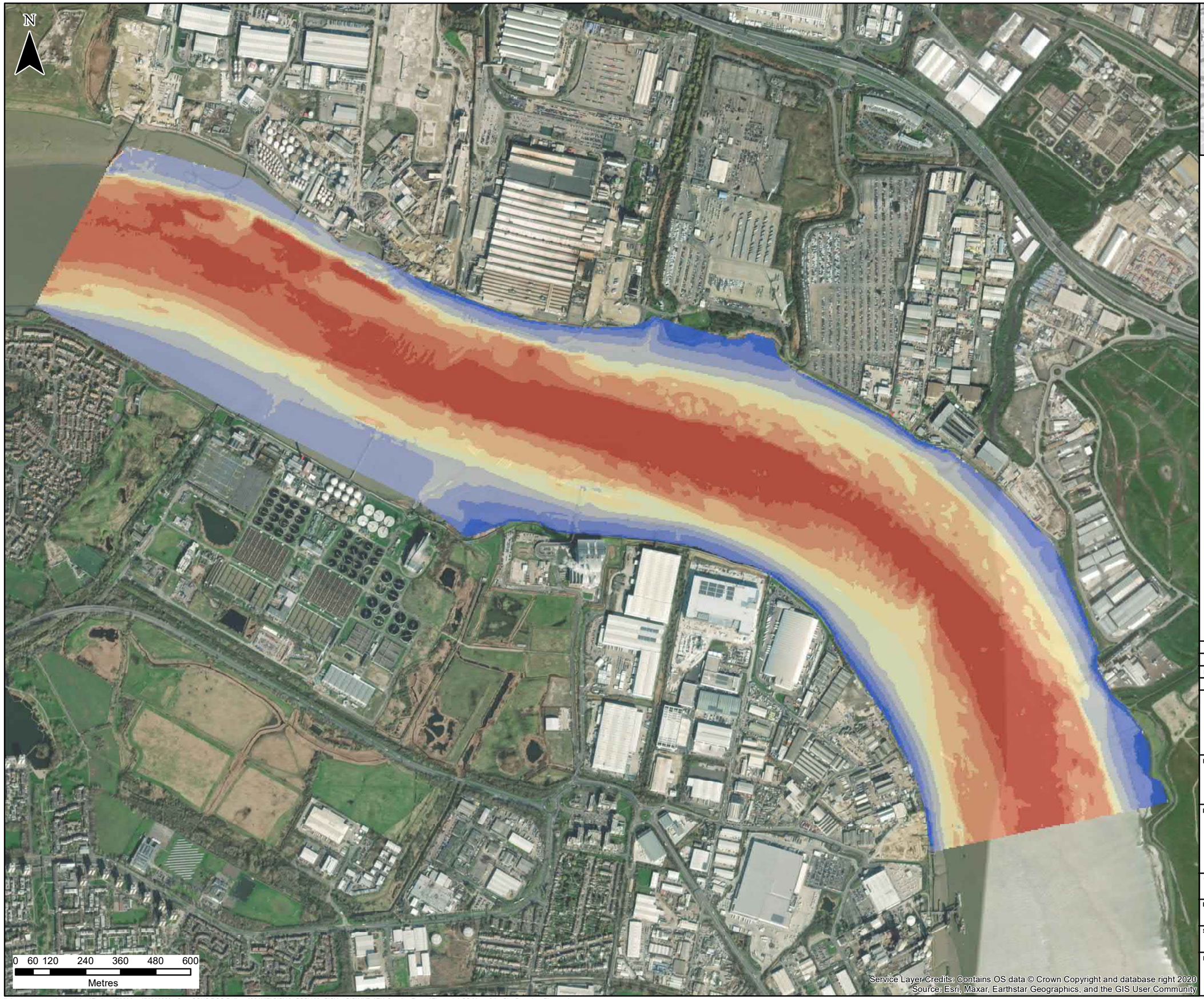
BATHYMETRY AND CHARTED DEPTHS

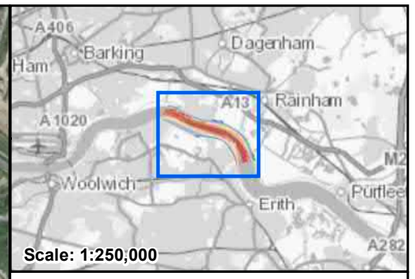
18.3.6. Between Crayford Ness and Dagenham depths of less than 7.0m below Chart Datum (CD) lie on the edges of both sides of the channel east-north-east and north-east of Jenningtree Point.

18.3.7. **Figure 18-2** shows a visual representation of the latest PLA bathymetric survey data for Halfway Reach, measurements are in metres relative to CD. The area within the authorised channel is shown as the area of greatest depth with the riverbed measuring more than -9mCD. Dredge pockets can be observed under and around Middleton Jetty, Ford's Jetty, and Jetty No. 4.

18.3.8. The riverbed is between -7mCD and -9mCD in proximity to the location of the Proposed Jetty (which will include provision for hydrogen export in addition to CO_2), and charted depths alongside currently range between -1.5mCD and -7mCD. Therefore, taking in to account the draught of the design vessel, the berth will need to be dredged to allow for access at all states of tide. The extent to which the riverbed will require dredging will depend on the draft of the design vessel.

18.3.9. The riverbed is between -7mCD and -9mCD in proximity to the location of the Proposed Jetty, and charted depths alongside currently range between +4mCD and -4.5mCD, depending on the location of the Proposed Jetty. Therefore, taking in to account the draught of the design vessel, the berth will need to be dredged to allow for access at all states of tide. The extent to which the riverbed will require dredging will depend on the draft of the design vessel.





Legend

Elevation (mAOD)

- <=-9
- -9- -7
- -7- -5
- -5 - -3
- -3 - -1
- -1 - -1
- 1 - 3
- 3 - 5
- 5 - 7
- >7

REVISION	DRAWN	CHECKED	APPROVED	DATE
P00	NB	JH	RA	3/14/2023

DESCRIPTION: FIRST DRAFT ISSUE

PROJECT TITLE: CORY DECARBONISATION PROJECT

DRAWING TITLE: FIGURE 18-2: BATHYMETRIC SURVEY (mAOD)

CONFIDENTIALITY: PUBLIC

DRAWN:	CHECKED:	APPROVED:	AUTHORISED:
NB	JH	RA	JW

SCALE @ A3 SIZE:	DATE:	REVISION:
1:12,000	3/14/2023	P02

DRAWING NUMBER: 70090329-WSP-00-XX-RP-ES-1802-P01-S0

VESSEL BASELINE ANALYSIS

18.3.10. In general, Halfway Reach sees lower vessel traffic than much of the rest of the tidal area of the River Thames; with the upstream area being dominated by local, in-land passenger and recreational vessels and the downstream area more frequented by commercial shipping associated with Tilbury and London Gateway ports, amongst other facilities. The vessels that most commonly frequent Halfway Reach are in-land non-passenger vessels, such as barges travelling to the various local wharfs and jetties, and commercial shipping from, and to, inner London.

18.3.11. The vessel traffic activity in the area surrounding the Proposed Scheme 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).

18.3.12. Analysis of Group 1 (powered commercial vessels) was undertaken using Thames Automatic Identification System (AIS) transponder data. Commercial vessels are mandated to transmit various vessel characteristics, such as position, speed, size and name at prescribed intervals, which can be converted to create vessel tracks.

18.3.13. As AIS is not required on small recreational vessels (although some larger recreational craft voluntarily carry it) analysis of Group 2 vessels (powered and unpowered recreational craft) is more qualitative in nature. Whilst information is available in publications, consultation with users of the River Thames will be necessary to ascertain detailed information on how they utilise the river. This will be undertaken as part of the pNRA which will be undertaken to support the application for a DCO.

18.3.14. **Figure 18-3** is a gate analysis plot showing the lateral distribution of all vessel transits (September 2021) though an upstream (west) and downstream (east) gate. The total number of east / west transits, occurring though each of the gates, is summarised in **Table 18-2**; the monthly transit totals are multiplied to give an estimation of the number of annual east / west transits though each of the gates. The gates identify all transits of the authorised channel and do not include movements made by Cory barges between Middleton Jetty and Cory's Barge Moorings. Cory tugs and barges account for approximately 3,120 annual transits within the Reach, with around 2,496 combined east / west transits though the upstream gate and 624 combined east / west transits though the downstream gate. Vessel traffic activity is focused within the authorised channel, with vessels transiting to the key jetties and moorings sites in the area being the exception.

Cory Carbon Capture Utilisation and Storage

All Vessel Types Gate Analysis (2021)

Legend

Authorised Channel copy

Transits/month

- 0 - 25
- 25 - 50
- 50 - 75
- 75 - 100
- 100 - 150

Figure 18-3: NASH Ltd Gate Analysis, All Vessel Traffic (AIS September 2021)

Drawing Number: 70090329-WSP-00-XX-RP-ES-1803-P01-S0

Notes

AIS Data: PLA (Sept 2021)
Charts: PLA chart 327 & 328

Client

Projection System: EPSG:32630

NOT FOR NAVIGATION

Issue Details

Drawn: CLC	
Checked: SAB	
Approved: SAB	
Date: 8/2/2023	
ID: NASH0261	

NASH Maritime Ltd
1 Canute Road
Southampton
SO14 3FH
info@nashmaritime.com

0 100 200 m

Table 18-2: NASH Ltd Summary of Total Vessel Transits (AIS September 2021)

Direction of Transit	Total Transits	Total Annualised Transits
Downstream Gate		
East Transits	602	7,224
West Transits	605	7,260
Upstream Gate		
East Transits	672	8,064
West Transits	669	8028

18.3.15. **Figure 18-4** shows a vessel traffic density plot, the majority of vessel traffic activity is focused within the authorised channel and Middleton Jetty. There are limited numbers to the north and south of the authorised channel, likely associated with shallow draft vessels and vessels departing the channel to approach jetty and mooring locations.

Cory Carbon Capture Utilisation and Storage

All Vessel Types Tranist Density (2021)

Legend

Authorised Channel

Transits/month

- 1 - 20
- 20 - 50
- 50 - 80
- 80 - 100
- 100 - 155

N

0 100 200 m

Figure 18-4: NASH Ltd Vessel Traffic Density Plot (AIS September 2021)

Drawing Number: 70090329-WSP-00-XX-RP-ES-1804-P01-S0

Notes

AIS Data: PLA (Sept 2021)
Charts: PLA chart 327 & 328

Client

Projection System: EPSG:27700 | NOT FOR NAVIGATION

Issue Details

Drawn: CLC	
Checked: SAB	
Approved: SAB	
Date: 8/2/2023	
ID: NASH0261	

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Figure Ref: NASH-0235_CCC_AllTracksDensity_20220804

FUTURE BASELINE

18.3.16. The Thames Vision 2050 goals (**Ref 18.17**) and 'Future Trade' developed through the Port of London forecasts (**Ref 18.18**) will add to river traffic but are unlikely materially to change the type of vessels transiting the Study Area (the Study Area is defined in **Section 18.4** below) or the typical use of that 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 navigation risks of the Proposed Scheme.

18.3.17. Once Riverside 2 is operational, in order to supply both Riverside 1 and Riverside 2, the Cory marine operation will expand to include:

- 16 vessel movements per day (includes arrivals and departures):
  - six upstream arrivals and departures; and
  - two downstream arrivals and departures.
- All tug and barge vessel movements will occur over one (daytime) tide other than ash movement to Tilbury (downstream) which is over two tides;
- 6-day a week operation; and
- Approximately 4,990 tug and barge movements per annum to Middleton Jetty.

18.3.18. This equates to an increase of approximately 870 tug and barge movements to Middleton Jetty as opposed to the current baseline scenario (Riverside 1 only).

18.3.19. The marine operations for Riverside 2 were the subject of a Navigational Risk Assessment (NRA) that formed a technical appendix to the ES prepared for Riverside 2 (**Ref 18.21**). 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 with existing risk controls in place".*

18.4. STUDY AREA

18.4.1. 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 Crossness Sewage Treatment Works Jetty and downstream past the bend of the River Thames and the Thames Water Utilities Limited Barge Moorings, as outlined by the dashed blue line in **Figure 18-1: Key Navigational Features**.

18.5. SENSITIVE RECEPTORS / RESOURCES

18.5.1. 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[22];

[22] For the purposes of the assessment this will include vessels used for maintenance dredging.

- Proposed Scheme construction vessels (including vessels for construction dredging);
- Cargo vessels;
- Tankers;
- Passenger vessels;
- Cory tugs and barges;
- Existing infrastructure e.g. Middleton Jetty; and
- Proposed Jetty.

18.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION PHASE

18.6.1. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- Definition of operational limitations: a key risk control measure will be the suitable operational limitations at which marine construction must cease, such as wind, height of tide, tidal stream, visibility and minimum available underkeel clearance (UKC).
- Deconfliction of operations: to avoid congestion within the authorised channel, operations should be deconflicted as much as practicable.
- Location of the Applicant's additional barge moorings: additional barge moorings should be positioned on the southern side of the River Thames and west of Middleton Jetty in order to reduce the impact of regular vessel movements by the Applicant's vessels and construction vessels on passing vessels.
- Passage Plan: a passage plan for operations during the construction phase created and maintained by Cory and provided to the PLA.
- Life-saving equipment: any structures or vessels subject to a River Works Licence are considered in terms of the riparian lifesaving equipment PLA requirements.
- Tug requirements: ship simulations and consultation with PLA to determine tug requirements for berthing manoeuvres.

OPERATION PHASE

18.6.2. Relevant design, mitigation and enhancement measures will be identified in the ES and the pNRA, and these may include:

- Abort points: due consideration would be given to appropriate contingency anchorages and abort points that could be utilised should a tanker vessel arriving at the Proposed Jetty experience difficulties on passage to the Jetty, or whilst coming alongside.
- Location and alignment of the Proposed Jetty: the berth would be orientated to mitigate the impact of the tidal set as much as possible, so reducing the likelihood of heavy contact and breakout.

- Positioning of berthing infrastructure: berthing infrastructure including fenders, bollards, gangways and shore connections would be designed to mitigate the consequences of the Proposed Scheme vessels ranging and resulting contact occurrences.
- Location of the Applicant's additional barge moorings: additional barge moorings should be positioned on the southern side of the River Thames and west of the Proposed Jetty in order to reduce the impact of regular vessel movements by the Applicant's vessels and operation vessels on passing vessels.
- Passage Plan: passage plan for operations during the operation phase created and maintained by the Applicant and provided to the PLA.
- Life-saving equipment: any structures or vessels subject to a River Works Licence are considered in terms of the riparian lifesaving equipment PLA requirements.
- Pilotage: Design vessel for the Proposed Scheme will be subject to compulsory pilotage under the PLA Pilotage Directions (**Ref. 18.3**).
- Tug requirements: ship simulations and consultation with PLA to determine tug requirements for berthing manoeuvres.

18.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

18.7.1. The likely significant effects associated with the construction and operation phases include:

- Collision – where two vessels collide underway, or the striking of an anchored or moored vessel by a vessel underway;
- Contact – a vessel making contact with a fixed or floating object (e.g. jetty, quay, pile, buoy);
- Grounding – a vessel coming into contact with the riverbed or shoreline;
- Breakout – a vessel breaking away from a securely moored position (or anchorage) and may result in damage to the vessel and/ or non-vessel objections e.g. mooring buoy); and
- Explosion – an explosion at the Proposed Scheme impacting navigation.

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

18.7.2. The final storage of captured CO_2, and compressed hydrogen, and the transport of either substance via the river is outside the scope of this assessment, and will therefore not be assessed.

18.7.3. The impacts scoped in or out for the marine navigation assessment are as shown in **Table 18-3**.

Table 18-3: Marine Navigation – Impacts Scoped in or Out of Further Assessment

Impacts	Phase	Scoped In	Scoped Out	Justification
Proposed Scheme vessel in collision with cargo vessel/ tanker/ passenger vessel/ recreational vessel/ Cory tug or barge	• Construction • Operation	✓		Further assessment required as to impact of tidal stream on navigation, sight lines due to the location of the Proposed Scheme on the river bend, future increase in vessel traffic and proximity to Middleton Jetty.
Collision between third party vessels resulting from action taken to avoid Proposed Scheme vessels				
Proposed Scheme vessel makes contact with marine works or Proposed Jetty				
Proposed Scheme vessel makes contact with existing infrastructure (e.g. Middleton Jetty)				
Cory tug and barge makes contact with marine works or Proposed Jetty				
Third party vessel makes contact with marine works or Proposed Jetty				
Proposed Scheme vessel grounds	• Construction • Operation	✓		Further assessment required regarding tidal restrictions to construction and operation phases. PLA charts stipulate

Impacts	Phase	Scoped In	Scoped Out	Justification
				that Mean High Water Neap in Halfway Reach is 5.8m.
Cory tug or barge grounds as a result of avoiding Proposed Scheme vessels	• Construction • Operation	✓		Further assessment required regarding tidal restrictions to construction and operation phases. PLA charts stipulate that Mean High Water Neap in Halfway Reach is 5.8m.
Third party vessel grounds as a result of avoiding Proposed Scheme vessels	• Construction • Operation	✓		Further assessment required regarding tidal restrictions to construction and operation phases. PLA charts stipulate that Mean High Water Neap in Halfway Reach is 5.8m.
Proposed Scheme vessel breakout	• Construction • Operation	✓		Further assessment required regarding impact of tidal stream and operational limiting parameters such as wind, height of tide, tidal stream, visibility etc.
Cory tug or barge breakout as a result of marine operations associated with the Proposed Scheme	• Operation			
Third party vessel breakout as a result of marine operations associated with the Proposed Scheme	• Operation			

Impacts	Phase	Scoped In	Scoped Out	Justification
Explosion at Proposed Scheme either landside or marine side impacting Proposed Scheme vessel or third party vessel	• Operation	✓		Further assessment required by process safety team to assess whether this is possible.

18.8. PROPOSED ASSESSMENT METHODOLOGY

18.8.1. The approach to the assessment of the Proposed Scheme will be discussed, and agreement sought, with the PLA. Based on the likely environmental impacts set out above, the scope of the assessment will include the following:

- A Preliminary Navigation Hazard Analysis (pNHA) will initially assess the potential impacts of the Proposed Scheme on the existing and future baseline scenarios. The result of this analysis will be discussed with the PLA and key stakeholders, through which the full scope of the NRA will be agreed.
- Navigation Risk Assessment will be undertaken to assess the potential impacts of the Proposed Scheme including but not limited to:
  - further in-depth vessel traffic analysis;
  - ship bridge simulations;
  - Thames Traffic Risk Modelling;
  - model future vessel traffic scenarios;
  - account for future increases in passenger vessel traffic;
  - stakeholder consultation; and
  - Risk Assessment.

18.8.2. The ES will summarise the findings of the NRA and will focus on potential likely significant effects within the Study Area (**Figure 18-1**). Assessment of both construction and operation impacts will be undertaken in line with the PLA's Risk Assessment methodology (**Ref 18.19**), and the Port Marine Safety Code (PMSC) (**Ref 18.20**), amongst other relevant guidance.

18.8.3. This approach is consistent across both the construction and operation phases.

18.8.4. Additional data and information sources that will be reviewed include:

- Automatic Identification System survey data;
- UK Admiralty Charts;
- PLA Charts 327 and 328;
- PLA Recorded Incidents;
- PLA Risk Assessment methodology;
- Further PLA Guidance;
- Marine Accident Investigation Branch for marine incident data;
- Royal National Lifeboat Institution for marine incident data; and
- The results of stakeholder consultation.

SIGNIFICANCE OF EFFECT CRITERIA

18.8.5. The significance of potential effects will be evaluated using a systematic approach based on identification of the frequency of the impact (i.e. sensitivity of receptor to change) and the consequence of the impact (i.e. magnitude of change), consistent with the approach identified **Chapter 3: EIA Methodology**.

18.8.6. The potential effects will be assessed in conjunction with the modelling results and professional judgement. The significance of potential effects will also take into account matters identified through consultation with stakeholders.

18.9. ASSESSMENT LIMITATIONS AND ASSUMPTIONS

18.9.1. The following limitations and assumptions have been identified:

- The marine navigation baseline and impact assessment will be carried out based on the information available and response received at the time of preparation.
- The desk-based data sources used will be the most up-to-date publicly available information as well as those provided through consultation. The data will therefore be limited by what is available and by what has been made available, at the time of undertaking the assessment.

18.10. REFERENCES

Ref 18.1: Ministry of Housing, Communities and Local Government. (2021). 'National Planning Policy Framework'. https://www.gov.uk/government/publications/national-planning-policy-framework--2

Ref 18.2: London Borough of Bexley (2012). 'Bexley Core Strategy'. https://www.bexley.gov.uk/sites/default/files/2020-05/Bexley-Core-Strategy.pdf

Ref 18.3: London Borough of Bexley. (2021). 'Draft Local Plan 2021'. https://www.bexley.gov.uk/sites/default/files/2021-10/Draft-local-plan-proposed-submission-document-reg-19-may-2021.pdf

Ref 18.4: Ministry of Housing, Communities and Local Government and Department for Levelling Up, Housing and Communities (2021) Planning Practice Guidance. Available at: https://www.gov.uk/government/collections/planning-practice-guidance

Ref 18.5: Department of Energy and Climate Change. (2011). 'Overarching National Policy Statement for Energy (EN-1)'. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref. 18.6: Department for Business, Energy & Industrial Strategy. (2021). Draft Overarching National Policy Statement for Energy (EN-1). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf**Ref 18.7**: Greater London Authority. (2021). 'The London Plan'. https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

Ref 18.8: London Borough of Bexley. (2004). 'Unitary Development Plan'. https://www.bexley.gov.uk/sites/default/files/2021-12/Bexley-unitary-development-plan-written-statement-2004.pdf

Ref. 18.9: Port of London Authority. (2017). 'Pilotage Directions'. Available at: https://www.pla.co.uk/assets/pilotagedirections.pdf

Ref. 18.10: Department for Transport, Maritime & Coastguard Agency. (2016). Port Maritime Safety Code. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/918935/port-marine-safety-code.pdf

Ref. 18.11: Pilotage Act 1987 (UK Public General Acts). Available at:

https://www.legislation.gov.uk/ukpga/1987/21/contents

Ref. 18.12: Merchant Shipping Act 1995 (UK Public General Acts). Available at:

https://www.legislation.gov.uk/ukpga/1995/21/contents

Ref. 18.8: Bexley Council. (2004). Unitary Development Plan. Available at: https://www.bexley.gov.uk/sites/default/files/2021-12/Bexley-unitary-development-plan-written-statement-2004.pdf

Ref. 18.13: MCA. (2021). 'MGN 654 Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response'. Available at: https://www.gov.uk/government/publications/mgn-654-mf-offshore-renewable-energy-installations-orei-safety-response

Ref. 18.14: MCA. (2021). 'Methodology for Assessing the marine Navigational Safety Risks & Emergency Response of Offshore Renewable Energy Installations'. Available at:https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/981718/MGN_654_Annex_1_NRA_Methodology_2021.pdf

Ref. 18.15: International Association of Lighthouse Authorities (IALA). (2013). 'Recommendations O-139 on the Marking of Man-Made Structures'. Available at: https://vasab.org/wp-content/uploads/2018/06/2013_IALA_Marking-of-Man-Made-Offshore-Structures.pdf

Ref. 18.16: International Maritime Organisation. (2018). 'Revised Guidelines for Formal Safety Assessment (FSA) for use in the International Maritime Organisation (IMO) Rule-Making Process'. MSC-MEPC.2/Circ.12/Rev.2. Available at: https://wwwcdn.imo.org/localresources/en/OurWork/HumanElement/Documents/MSC-MEPC.2-Circ.12-Rev.2%20-%20Revised%20Guidelines%20For%20Formal%20Safety%20Assessment%20(Fsa)For%20Use%20In%20The%20Imo%20Rule-Making%20Proces...%20(Secretariat).pdf

Ref. 18.17: Port of London Authority. (2023). Thames Vision 2050. Available at: https://thamesvision.pla.co.uk/

Ref. 18.18: Port of London Authority. (2021). 'Future Trade Through the Port of London'. Available at: https://www.pla.co.uk/assets/oeportoflondonreportfinal.pdf

Ref. 18.19: Port of London Authority. (No Date). Navigational Risk Assessment – Guidance to Operators and Owners. Available at: https://www.pla.co.uk/Safety/SMS/Navigational-Risk-Assessment-Guidance-to-Operators-and-Owners

Ref. 18.20: Maritime & Coastguard Agency. (2016). Port Marine Safety Code. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/918935/port-marine-safety-code.pdf

Ref 18.21: Cory Environmental Holdings Limited. 2018. Riverside Energy Park – Technical Appendix B.2: Navigational Risk Assessment. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010093/EN010093-000245-6.3%20ES%20Technical%20Appendices%20B.2%20Navigational%20Risk%20Assessment.pdf

19. MAJOR ACCIDENTS AND DISASTERS

19.1. INTRODUCTION

19.1.1. This chapter considers the vulnerability of the Proposed Scheme to major accidents and/or disasters (MA&D) during construction and operation caused by natural or manmade hazards (including operational failure) and any potential significant effects as well as impacts to receptors arising from MA&D affecting the Proposed Scheme.

19.1.2. The approach to the MA&D assessment will consider the Carbon Capture and Storage Project, the Hydrogen Project, the associated Proposed Jetty, and the ancillary infrastructure and equipment together unless explicitly stated otherwise.

19.1.3. This chapter also sets out the proposed methodology for the MA&D assessment and identifies those MA&D categories and types that can be scoped out of the assessment. Where necessary, further assessment will be presented in the ES.

19.1.4. Based on professional judgement, MA&D are events or situations that have the potential to affect the Proposed Scheme and to go on to cause immediate or delayed serious damage to one or more of the following: human health; welfare; cultural heritage; and the environment.

19.1.5. The list of MA&D categories and types to which the Proposed Scheme may be vulnerable during construction and operation phases are listed in **Table 19-1**.

Table 19-1: MA&D Categories and Types

Category	Type
Natural	Geophysical
	Hydrological
	Climatological and Meteorological
	Biological
Technological or Manmade Hazards	Societal
	Industrial and Urban Accidents
	Transport Accidents
	Pollution Accidents
	Utility Failures
	Malicious Attacks
	Engineering Accidents and Failures

19.1.6. This chapter should be read in conjunction with technical topic chapters (**Chapter 4: Air Quality** to **Chapter 18: Marine Navigation**) to provide a broader environmental context of the risks associated with these MA&D events/situations. These chapters also include examples of the measures that may be used to prevent or mitigate significant effects and details of the preparedness for, and proposed response to, emergencies. Measures will be identified further in the ES.

19.1.7. The definitions of key terms used in this chapter are given in **Table 19-2.** These definitions have been developed by reference to the definitions used in EU and UK legislation and guidance relevant to MA&D (as set out below) as well as professional judgement in the context of the Proposed Scheme.

Table 19-2: MA&D Key Terms and Definitions

Term	Definition
(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 their contractor(s) to respond. Serious damage includes the loss of life or permanent injury, and/or permanent or long-lasting damage to a receptor that cannot be restored through minor clean-up and restoration efforts. The significance of this effect will take into account the extent, severity and duration of harm and the sensitivity of the receptor.
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) expect to see workplace risks controlled.
Adaptive Capacity	The capacity of receptors to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.
Consultation Zone	The HSE sets a consultation distance 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 consultation distance is referred to as the consultation zone (CZ). The local planning authority is notified of this consultation distance and has a statutory

Term	Definition
	duty to consult the HSE on certain proposed developments within that consultation zone.
Disaster	In the context of the Proposed Scheme, 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 Site Boundary that may present a risk to the Proposed Scheme, e.g. if an external major event occurred (e.g. earthquake or a Control of Major Accident Hazards (COMAH) site major accident) it would increase the risk of serious damage to a 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.
Internal Influencing Factor	A factor which occurs within the Site Boundary 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.

Term	Definition
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 MA&D subject to assessment of its potential to result in a significant adverse effect on a 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; and • Recoverability – the temporal scale over and extent to which a receptor will recover following an effect.
Vulnerability	In the context of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (**Ref 19.1**) (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.

19.2. POLICY, LEGISLATION, AND GUIDANCE

19.2.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is as set out in **Table 19-3**. The National Planning Policy Framework (NPFF) 2021, London Borough of Bexley Core Strategy 2012 and the London Borough of Bexley Unitary Development Plan (UDP) 2004 do not include any policies relevant to MA&D.

Table 19-3: Major Accidents and Disasters – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement for Energy (EN-1) 2011 (Ref 19.2)	Sets out the Government's policy for delivery of major energy infrastructure and will be the primary basis for decision making. NPS EN-1 includes reference to the need for mitigation measures to *"prevent, control and mitigation major accidents".*
Draft Overarching National Policy Statement for Energy EN-1 2021 (Ref 19.3)	The Government has published a draft update to the Overarching National Policy Statement for Energy. The draft update contains similar wording to NPS EN-1 2011 (**Ref 19.2**) with regards to major accidents.
The London Plan 2021 (Ref 19.4)	The London Plan 2021 is the Spatial Development Strategy for Greater London. It sets out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policy D11: Safety, Security and Resilience to Emergency sets out 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".*
London Borough of Bexley Draft Local Plan 2021 (Ref 19.5)	The new Local Plan is awaiting adoption and will then replace the UDP and Core Strategy. Policy DP 28: 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".*

Policy / Legislation / Guidance	Description
Legislation	
Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (Ref 19.1)	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). 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) (Ref 19.6)	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.

Policy / Legislation / Guidance	Description
Construction (Design and Management) (CDM) Regulations 2015 (Ref 19.7)	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 (Ref 19.8)	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.
The Planning (Hazardous Substances) Regulations 2015 (Ref 19.9)	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

Policy / Legislation / Guidance	Description
	environmental consequence) occurring during the construction and operation phases.
The Supply of Machinery (Safety) Regulations 2008 (Ref 19.10)	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) (Ref 19.11)	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 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 Regulations 1996 and 2016 (Ref 19.12)	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. 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 or

Policy / Legislation / Guidance	Description
	hydrogen from the Proposed Scheme and therefore reduce the risk of a major accident.
Occupier's Liability Act 1984 (c.3) (Ref 19.13)	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 (Ref 19.14)	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) (Ref. 9.15)	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.
IEMA: Major Accidents and Disasters in EIA: A Primer 2020 (Ref 19.16)	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	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:

Policy / Legislation / Guidance	Description
Management 2011 (Ref 19.17)	• 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 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 (Ref 19.18)	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

Policy / Legislation / Guidance	Description
	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, Habitats and Environmental Liability 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 (Ref 19.19)	This guidance identifies a number of 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. 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.

19.3. BASELINE CONDITIONS AND FUTURE BASELINE

19.3.1. 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 for the existing locality.

19.3.2. The baseline conditions described for MA&D are derived from the following desk study sources:

- National Risk Register of Civil Emergencies (**Ref 19.20**);
- London Risk Register (**Ref 19.21**);
- British Geological Survey (BGS) GeoIndex Onshore (**Ref 19.22**);
- Tsunamis Hazard Map (**Ref 19.23**);
- The International Disaster Database (**Ref 19.24**);
- Health and Safety Executive's (HSE) Planning Advice Web App (**Ref 19.25**);
- HSE's COMAH 2015 Public Information Search (**Ref 19.26**);
- Ordnance Survey mapping;
- Google aerial and street view maps (**Ref 19.27**); and
- Technical topic chapters (**Chapter 4: Air Quality** to **Chapter 18: Marine Navigation**).

19.3.3. The information gathered and presented within the ES for Riverside 2 will inform the baseline relevant to MA&D, where relevant.

FUTURE BASELINE

19.3.4. The future baseline for the Proposed Scheme will include the operation of Riverside 2.

19.3.5. Existing commercial business within the Site Boundary would remain at their current locations should the Proposed Scheme not proceed. These include Riverside 1, the Middleton Jetty and the Munster Joinery Warehouse.

19.4. STUDY AREA

19.4.1. The following factors, and associated distances, were adopted for setting the Study Area to capture internal and external influencing factors that may have high adverse consequences on the Proposed Scheme:

- Manmade features:
  - Airports and airfields within 13km (the general safeguarding zone);
  - Control of Major Accident Hazard facilities within 5km;
  - Major accident hazard pipelines within 1km;

  - Fuel retail sites (including Liquified Natural Gas, Liquified Petroleum Gas) within 1km;
  - Rail infrastructure within 500m; and
  - Transmission (gas, electrical, oil/fuels) crossing the Site Boundary.
- 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).

19.4.2. The Study Area has been based primarily on information held by the Applicant and information gathered to inform this chapter from the data sources discussed earlier.

19.5. SENSITIVE RECEPTORS / RESOURCES

19.5.1. Schedule 4 of the EIA Regulations (**Ref 19.1**) sets out the information that should be included in an ES where that information is relevant to the specific characteristics of the development. As such, this chapter has considered the following receptors:

- 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.

19.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

19.6.1. Relevant design, mitigation and enhancement measures will be identified in the ES, and these may include:

- good engineering practice (during the construction and operation phases);
- Environmental, Health & Safety Management systems (during the construction and operation phases);
- supplier management environmental, health and safety standards (e.g. Construction Skills Certification Scheme) (during the construction and operation phases);
- risk management systems (during the construction and operation phases); and
- a Code of Construction Practice (CoCP) (during the construction phase).

19.6.2. This Report assumes that embedded mitigation measures identified in each of the technical topic chapters (**Chapter 4: Air Quality** to **Chapter 18: Marine Navigation**) and in **Table 19-4** below will be implemented for the Proposed Scheme in considering the potential magnitude of impact.

19.7. DESCRIPTION OF POTENTIAL VULNERABILITY TO MAJOR ACCIDENT AND DISASTER RISKS

19.7.1. There is no published guidance for the application of the legal requirements to the assessment of MA&D. However, selected relevant guidance for risk assessment methodologies is summarised in **Table 19-3**.

19.7.2. In addition to the information sources used to collate baseline information (detailed in **Section 19.3**), the following have been consulted to support the identification of potential MA&D:

- The Cabinet Office National Risk Register of Civil Emergencies (2020 Edition) (**Ref 19.20**). This document is the unclassified version of the National Risk Register, and it identifies the main types of civil emergencies that could affect the UK in the next five years. It is recognised, however, that this document does not provide an all-encompassing list of all potential accidents and disasters and its timescales are short term.
- The London Risk Register (Version 11) (**Ref 19.21**). This document summarises the main risks affecting Greater London.
- The International Federation of Red Cross & Red Crescent Societies Early Warning, Early Action (**Ref 19.28**). This guidance looks to other countries including those in warmer climates, thereby identifying risks that the UK may encounter in the future in light of climate change and global warming.
- The International Disaster Database (**Ref 19.24**) contains data covering over 22,000 mass disasters in the world since 1900 to the present day and aims to "*rationalise decision making for disaster preparedness, as well as provide an objective base for vulnerability assessment and priority setting*".

SCOPING PROCESS FOR MAJOR ACCIDENT AND DISASTER RISKS

19.7.3. A three-tiered process has been used at this stage to scope MA&D groups/categories/types either in or out for assessment in the ES.

19.7.4. Firstly, low likelihood and low consequence events are scoped out as these are unlikely to result in significant adverse effects; because they do not fall into the definition of a MA&D. Highly likely and low consequence events are also scoped out, as they will not lead to significant adverse effects. Furthermore, high likelihood and high consequence events are also scoped out, as it is assumed that existing legislation and regulatory controls would not permit the Proposed Scheme to be progressed under these circumstances.

19.7.5. The second component is in accordance with emerging EIA practice, whereby occupational health and safety (H&S) is scoped out of this topic. Other health issues are covered in relevant topic sections of **Chapter 4: Air Quality, Chapter 5: Noise and Vibration**, and **Chapter 10: The Water Environment and Flood Risk**. As 'in combination' impacts, human health is also considered within **Chapter 20: Cumulative Effects,** not least as it is covered by detailed H&S legislation: The Management of Health and Safety at Work Regulations 1999, The Workplace (Health, Safety and Welfare) Regulations 1992 and The Dangerous Substances and Explosive Atmospheres Regulations 2002.

19.7.6. The third component is the formation of the long list of all possible MA&D groups, categories and types. This is reviewed to rule out any potential MA&D that are considered highly unlikely to occur due to the location of the Proposed Scheme, based on baseline information and information provided by for the technical topics relevant to MA&D.

19.7.7. Those MA&D types that cannot be screened out from the three-tier process will require further detailed assessment in the ES.

19.7.8. The review of the MA&D groups, categories and types identified in the Study Area, has been undertaken to inform the scoping process, summarised in **Table 19-4**. This table shows the potential vulnerability of the Proposed Scheme to the risk of an MA&D at the type of level. The phases are indicated in the table as "C" for construction and "O" for operation. The ES will provide greater assessment and justification for the topic areas scoped in and for those that are scoped out no further assessment is considered necessary in the EIA.

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

19.7.9. The impacts scoped in or out for the MA&D assessment are as shown in **Table 19-4**.

Table 19-4: Major Accidents and Disasters – Scoped In or Out of Further Assessment

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
Natural Hazards	Geophysical	Earthquakes	Do not occur in Britain of a sufficient intensity owing to the motion of the Earth's tectonic plates causing regional compression. Uplift from the melting of the ice sheets that covered many parts of Britain thousands of years ago can cause movement. The BGS (**Ref 19.22**) acknowledges that, on average, a magnitude 4 earthquake happens in Britain roughly every two years and a magnitude 5 earthquake occurs around every 10 to 20 years. As such the Cabinet Office National Risk Register of Civil Emergencies states that "*Earthquakes in the UK are moderately frequent but rarely result in large amounts of damage. An earthquake of sufficient intensity (determined on the basis of the earthquake's local effect on people and the environment) to inflict severe damage is unlikely*" (**Ref 19.20**). The Proposed Scheme is not located in, or close to, an active area. Therefore, further consideration of this risk is not required as part of the ES.	X
Natural Hazards	Geophysical	Volcanic Activity	The Proposed Scheme is not located in, or close to, an active area. It is highly unlikely that an ash cloud could significantly impact on any aspect of the Proposed	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			Scheme. Therefore, further consideration of this risk is not required as part of the ES.	
Natural Hazards	Geophysical	Landslides	The Proposed Scheme is surrounded by flat topography. There are no records of historical landslides in the area. No steep slopes or embankments are expected to be constructed as part of the Proposed Scheme. Therefore, further consideration of this risk is not required as part of the ES.	X
Natural Hazards	Geophysical	Sinkholes	Natural sinkholes have been recorded in Greater London however, these have not been in the vicinity of the Proposed Scheme. The geotechnical design of the Proposed Scheme will take into consideration the underlying geology and any potential ground stability issues. Therefore, further consideration of this risk is not required as part of the ES.	X
Natural Hazards	Geophysical	Tsunamis	The Proposed Scheme is located in London, within (Proposed Jetty) and adjacent to the River Thames. Tsunami risk in England is considered to be low, although potential meteotsunamis (caused by weather conditions rather than seismic activity) have been recorded on several occasions in the UK. Meteotsunamis commonly strike the coasts of the UK, damaging harbours, boats and very rarely, causing fatalities. There are no records of historical	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			meteotsunamis affecting the River Thames. Flood defences in the River Thames would likely offer some protection in such an eventuality, although it is a possibility that these defences could be overwhelmed. This risk event type has been scoped out on the basis that any risks will be captured under the coastal flooding and flood defence failure MA&D types.	
Natural Hazards	Hydrological	Coastal Flooding	The Proposed Scheme is located on the River Thames, which is a tidally influenced river. The Environment Agency Flood Map for Planning (**Ref 19.29**) shows that the Proposed Scheme is located within Flood Zone 3. This indicates that the Proposed Scheme is located 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 Environment Agency maintained flood defences located along the River Thames, parts of which are within the Site Boundary. These will provide the Proposed Scheme with a reduction in local flood risk. Therefore, it is proposed to scope in this MA&D type for further consideration in the ES.	✓ C, O
Natural Hazards	Hydrological	Fluvial Flooding	The primary sensitive surface water feature within the Site Boundary is the River Thames. There are records of fifteen minor sensitive surface water features onsite	✓ C, O

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			comprising underground and surface level inland rivers. Environment Agency Flood Map for Planning (Rivers and Sea) indicates that the Proposed Scheme is located in the high-risk Flood Zone 3, where the annual risk of flooding from fluvial sources is more than 1 in 100 (1%), not accounting for engineered flood protection schemes. High levels of precipitation (i.e. in winter) could result in the flooding of the Proposed Scheme. Therefore, it is proposed to scope in this MA&D type for further consideration in the ES.	
Natural Hazards	Hydrological	Pluvial Flooding	The London Regional Flood Risk Appraisal (2018) (**Ref. 19.30**) indicates that flooding is a major issue for Greater London and increasing due to climate change. Although the Study Area is significantly drier than the national average in both summer and winter, extreme events do occur. A recent, notable extreme rainfall event for the region was flash flooding in October 2022, where some areas saw a months' worth of rain in a day. With regard to future projections, UKCP18 (**Ref. 19.31**) suggests that climate change is projected to lead to wetter winters and drier summers although natural variation, including extreme events such as storms, heavy downpours and heatwaves, will continue to punctuate these trends. Under a high emission scenario (RCP8.5) it is estimated that by the 2030s,	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			precipitation in winter is likely to increase by 6.5% at the 50th percentile. The increase in impermeable surfaces as a result of the Proposed Scheme along with the likely increase in rainfall as a result of climate change over the lifetime of the Proposed Scheme would increase flood risk if not mitigated. However, mitigation against future flood risk is considered in the **Chapter 11: Climate Resilience** and therefore does not require further consideration as part of the MA&D assessment.	
Natural Hazards	Hydrological	Groundwater Flooding	The Study Area is not located within a Drinking Water Safeguard Zone for either surface or groundwater or a Groundwater Source Protection Zone. Several aquifers are present in the Study Area, including a Secondary Undifferentiated aquifer (superficial alluvium), three Secondary A aquifers (the Blackheath Member (Harwich Formation), Lambeth Group, and Thanet Formation) and a Principal aquifer (Upper Chalk Formation). Groundwater emergence is therefore possible. Groundwater may also be present as discontinuous pockets of perched water within the Made Ground within the Site Boundary. The risk of groundwater flooding across the Site is categorised as being moderate.	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			The construction and operation of the Proposed Scheme is not expected to elevate groundwater flooding risk. There is not a high risk of groundwater flooding within the area of the Proposed Scheme, and no significant excavations are proposed. Therefore, further consideration of groundwater flooding is not required as part of the MA&D assessment.	
Natural Hazards	Hydrological	Avalanches	The Proposed Scheme's topography is relatively flat and therefore an avalanche will not occur. Therefore, further consideration of this risk is not required as part of the ES.	X
Natural Hazards	Climatological and Meteorological	Cyclones, hurricanes, typhoons, storms and gales	Cyclones, hurricanes and typhoons do not occur in the UK. Southeast England is more sheltered than other parts of the UK, with less rainfall and fewer incidences of strong winds overall. However, extreme events have been known to occur. The most recent notable gale affecting the region was in February 2022 where Storm Eunice led to wind speeds reaching over 50mph in the area of the Proposed Scheme, resulting in damage to some buildings. Storms and gales could result in damage to new site infrastructure, property and works on-site. However, it is anticipated that the risk of vulnerability to a MA&D for the Proposed Scheme would be comparable to that for Riverside 1 and design	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			standards would take into account these weather conditions which would be pursuant to the requirements of the draft DCO. Specific measures are therefore not considered to be required as part of the Proposed Scheme.	
Natural Hazards	Climatological and Meteorological	Thunderstorms	This type of event could result in lightning strikes to temporary elevated structures during construction (e.g. tower cranes) and new elevated structures (such as stacks) introduced as part of the Proposed Scheme; however, the risk is no different to similar elevated structures for Riverside 1. New elevated structures will be designed considering historical site experience and current design standards that consider climate change resilience which would be pursuant to the requirements of the draft DCO. Specific measures are therefore not considered to be required as part of the Proposed Scheme.	X
Natural Hazards	Climatological and Meteorological	Wave surges	The Proposed Scheme is located sufficiently inland, and therefore is not subject to wave surges	X
Natural Hazards	Climatological and Meteorological	Extreme temperatures: Heatwaves Low (sub-zero)	High temperature records are being broken with increasing frequency. On 3rd August 1990, a record high of 37.1°C was reached in Cheltenham. This was broken in 2003, when 38.5°C was reached in Faversham, Kent, then again in 2019, when Cambridge	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
		temperatures and heavy snow	reached 38.7°C, and most recently on 19th July 2022, when the current record of 40.3°C was recorded in Coningsby, Lincolnshire and the Met Office declared its first ever red alert for heat and declared a national emergency. Widespread transport disruption occurred, and the increased electricity demand almost led to a blackout in London, which was averted by the emergency purchase of electricity. The most widespread and prolonged low temperatures and heavy snow in recent years occurred from December 2009 to January 2010. Daytime temperatures were mostly sub-zero across the UK. At night, temperatures in England regularly fell to -5°C to -10°C. Snowfall across the UK lasted for some time, allowing 20cm to 30cm of snow to build up, closing schools and making it very difficult to travel. At the Site Boundary: • Between 1981 and 2010, there were 12 occurrences in which summer mean temperatures exceeded 27.5°C on five or more consecutive days. • Between 1981 and 2010, there have been 31 days with a maximum minimum temperature below zero degrees Celsius.	

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			• Between 1981 and 2010, there were 160 days with snow lying at 0900 however, there are no records from the Met Office of the depth of snow. The Proposed Scheme will be vulnerable to extreme temperatures. However, it is not expected to increase risks associated with extreme weather in the area. Therefore, specific measures are not considered to be required as part of the Proposed Scheme.	
Natural Hazards	Climatological and Meteorological	Droughts	Over the past 40 years or so England has experienced five long-duration droughts and two shorter periods of drought. Southern England is prone to drought. The Kent and South London Environment Agency Area was declared as in-drought in August 2022. Potable water in the area surrounding the Site Boundary is supplied by Thames Water, which sources 80% if its supplies from river abstraction. A number of aquifers are present in the project area and an active licenced surface water abstraction point located 15m to the west of the Site abstracts from the River Thames. It is not anticipated that the Proposed Scheme will significantly impact abstraction points, but it is possible that dewatering during construction may have an impact on nearby water courses with a groundwater baseflow component. The River Thames has been identified as experiencing some water resource availability issues, notably when	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			its source dried out completely during the 2022 heatwave. Prolonged periods of drought can also impact infrastructure as drying out and cracking of soils may affect structural stability, and prolonged dry periods can lead to cracking of surfaces and more rapid deterioration of materials. Decreased rainfall combined with an increase in the average temperature can also increase subsidence, affecting the stability of the foundations and structures. The Proposed Scheme would be vulnerable to drought as water is used in hydrogen production and cooling, however in the event of water scarcity the facility could be safely shut down. The design of the sub-structure will be resilient to ground shrinkage and this risk would be considered in the development of the design for the Proposed Scheme.	
Natural Hazards	Climatological and Meteorological	Severe Space Weather: Solar Flares	Solar flare events are known to interrupt radio and other electronic communications. Records from solar storms in 1921 and 1960 describe widespread radio disruption and impacts on railway signalling and switching systems. There will be the use of technology to control processes and plant, however this will be appropriately	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			protected, therefore the Proposed Scheme is no more vulnerable than the current baseline.	
Natural Hazards	Climatological and Meteorological	Severe Space Weather: Solar Energetic Particles	Solar energetic particles cause solar radiation storms, but only in outer space. Therefore, further consideration of this risk is not required as part of the ES.	X
Natural Hazards	Climatological and Meteorological	Severe Space Weather: Coronal Mass Ejections	Coronal mass ejections (CME) cause geomagnetic storms. The geomagnetic storm in 2003 caused the UK aviation sector to lose some Global Positioning System (GPS) functions for a day, however no known significant impact on road users or infrastructure.	X
Natural Hazards	Climatological and Meteorological	Fog	Fog is one of the most common weather conditions in the UK, particularly throughout autumn and winter. Severe disruption to transport occurs when the visibility falls below 50m over a wide area. However, the Proposed Scheme, as a stationary installation, will not be vulnerable to fog. The only risks would be to staff travelling to the Site, but this risk would not be significantly different from the baseline. The health and safety of staff is also managed by occupational health and safety legislation.	X
Natural Hazards	Climatological and Meteorological	Wildfires: Forest fire, Bush / brush, pasture	In April and May 2011 numerous wildfires broke out across the UK after unusually hot and dry weather.	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			England received only 21% of its usual rainfall for April 2011. The Proposed Scheme is located in a heavily urbanised area. There is some vegetation in the surrounding area, but it does not have a potential high fuel load (e.g. gorse) and it is unlikely that a wildfire would occur. Urban fires are assessed under Manmade hazards elsewhere in this assessment.	
Natural Hazards	Climatological and Meteorological	Poor Air Quality	In 2006, the UK experienced two periods of extended hot weather with associated elevated ozone and harmful airborne particles. In the spring of 2015, two particle pollution episodes caused widespread poor air quality throughout the UK, with multiple areas measuring 'High' on the Daily Air Quality Index and resulted in around 1,100 deaths due to exacerbation of pre-existing ill-health conditions. The summer of 2015 also contained two elevated ozone episodes. Construction: Construction effects would be temporary for the duration of the construction phase. Increased dust emissions from construction activities and traffic could lead to potential loss of amenity at sensitive receptors. Traffic management measures may result in both positive and adverse changes to emissions from vehicle exhausts and roadside pollution concentrations. Operation: The Proposed Scheme is expected to result in additional emissions as a result of increased road	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			traffic and marine vessel movements. The Proposed Scheme will result in a change to the emissions of pollutants associated with the combustion of waste at Riverside 1 (currently regulated by the Environment Agency under an Environmental Permit) including new pollutants (including amines and aldehydes). There will also be new pollutants associated with emissions from the Hydrogen Project and from the new backup power generators, as appropriate. The introduction of these new emission sources and pollutants will require an Environmental Permit. In the determination of the Environmental Permit, the Environment Agency will set emission limits for the new pollutants to air together with the requirement to implement appropriate mitigation measures to prevent harm to environmental receptors. Therefore, significant residual air quality effects which could result in a MA&D are not anticipated during construction and operation of the Proposed Scheme.	
Natural Hazards	Biological	Disease epidemics: • Viral • Bacterial • Parasitic	The Proposed Scheme is located in a developed country where the population is in general good health. Disease epidemics in England are currently limited to COVID-19, the first cases of which were identified in February 2020. COVID-19 is currently a global pandemic, and the vulnerability of the Proposed Scheme to a MA&D caused by this pandemic during	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
		• Fungal • Prion	construction and operation should be mitigated by the occupational health and safety processes that are implemented by both the contractor and government rules and guidelines on the control of spread of COVID-19. The UK Health Security Agency (UKHSA) is the executive agency of the Department of Health responsible for protecting the nation from public health hazards and preparing for and responding to public health emergencies. One of the UKHSA's functions is to protect the public from infectious disease outbreaks and the Agency has produced a document providing operational guidance for the management of outbreaks of communicable disease, 'Communicable Disease Outbreak management: Operational Guidance' (**Ref. 19.32**). Risks from Weil's Disease (or leptospirosis) are considered to be of low likelihood, but not of high consequence as a low number of people contract this disease in the UK each year. It would be unlikely for any staff to contract Weil's Disease as appropriate PPE will be worn and any risks managed in the CoCP. The use of the Proposed Scheme is not going to give rise to any disease epidemics.	

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
Natural Hazards	Biological	Animal Diseases: • Avian influenza; • West Nile virus; • Rabies; • Foot and mouth; and • Swine fever.	Low and highly pathogenic avian influenza has been recorded in poultry in the UK several times in the last 10 years, most recently in the winter of 2021/22, although with no human cases reported. There was a devastating foot and mouth outbreak in 2001. There are no known foot and mouth burial pits in the area, and it is considered unlikely that they will be present in the project area due to its highly urbanised location. The use of the Proposed Scheme is not going to be the source of any disease epidemics and spread would be controlled through containment of infected animals including prohibition of transportation.	X
Natural Hazards	Biological	Plants	**Chapter 6: Terrestrial Biodiversity** identifies that a survey of Invasive Non-Native Species will be undertaken within the Site Boundary. Standard control measures would be implemented by the appointed contractor during construction to handle and dispose of any diseased plants and/or injurious weeds and prevent their spread.	X
Technological or Manmade Hazards	Societal	Extensive public demonstrations which could lead	The Proposed Scheme is located in a developed country that has steady, yet small population growth. England is politically stable with no direct border with countries experiencing conflicts. The Proposed	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
		to violence and loss of life.	Scheme should not lead to high profile public demonstrations or disorder.	
Technological or Manmade Hazards	Societal	Widespread damage to societies and economies.	The Proposed Scheme is located in a developed country that has steady, yet small population growth. England is politically stable with no direct border with countries experiencing conflicts. It is proposed to address positively key policy priorities for climate change.	X
Technological or Manmade Hazards	Societal	The need for large-scale multi-faceted humanitarian assistance.	The Proposed Scheme is located in a developed country that has steady, yet small population growth. England is politically stable with no direct border with countries experiencing conflicts.	X
Technological or Manmade Hazards	Societal	The hindrance or prevention of humanitarian assistance by political and military constraints.	The Proposed Scheme is located in a developed country that has steady, yet small population growth. England is politically stable with no direct border with countries experiencing conflicts.	X
Technological or Manmade Hazards	Societal	Significant security risks for humanitarian	The Proposed Scheme is located in a developed country that has steady, yet small population growth. England is politically stable with no direct border with countries experiencing conflicts.	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
		relief workers in some areas.		
Technological or Manmade Hazards	Societal	Famine	The Proposed Scheme is located in a developed country that produces its own crops and imports food. It is politically stable and not subject to hyperinflation and therefore food is available, whether produced within the UK or imported. Famine is also not relevant to the use of the Proposed Scheme.	X
Technological or Manmade Hazards	Societal	Displaced population	There will be no significant displacement of populations as part of the Proposed Scheme.	X
Technological or Manmade Hazards	Industrial and Urban Accidents	Major Accident Hazard Chemical sites	There are four Control of Major Accident Hazard (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	✓ C, O

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			• Riverside Sewage Treatment Works, Thames Water Utilities Limited (Lower Tier) (approximately 1.8km from the Site Boundary). Therefore, it is proposed to scope in this MA&D type for further consideration in the ES.	
Technological or Manmade Hazards	Industrial and Urban Accidents	Major Accident Hazard Pipelines	There are no major accident hazard pipelines within 1km of the Proposed Scheme.	X
Technological or Manmade Hazards	Industrial and Urban Accidents	Nuclear	Nuclear sites are designed, built and operated so that the chance of accidental releases of radiological material in the UK is extremely low. Last historical major accident in the UK was Windscale in 1957. There are no nuclear sites within 5km of the Site Boundary. The closest nuclear site is Bradwell Nuclear Power Station, located approximately 80km to the east.	X
Technological or Manmade Hazards	Industrial and Urban Accidents	Fuel storage	In December 2005, Europe's largest peacetime fire occurred at the Buncefield Oil Storage Terminal in Hemel Hempstead, England. The surrounding area was temporarily evacuated and some local businesses experienced long term disruption to operations. There are two COMAH regulated fuel storage sites within the Study Area, which have been considered under the Major Accident Hazards Chemical Sites MA&D type above.	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			There are also several commercial fuel stations, including a BP station at Abbey Wood approximately 2km to the Southwest, a Morrisons petrol station approximately 2.5km to the southeast, and a Morrisons petrol station approximately 3km to the west from the Site Boundary. The inventory of fuel held at the fuel station sites is relatively small (i.e. below COMAH thresholds) and the hazardous area classification zones will not extend beyond the petrol station boundary. Therefore, further assessment in the ES is not required.	
Technological or Manmade Hazards	Industrial and Urban Accidents	Dam breaches	Dam breaches in the UK are rare; the last major breach was at the Cwm Eigiau dam in 1925, which caused 17 fatalities and widespread flooding. No dam has been identified within 5km of the Proposed Scheme.	X
Technological or Manmade Hazards	Industrial and Urban Accidents	Mines and storage caverns	Coal Authority records state that there are no areas of coal workings in the area of the Proposed Scheme. No active or historic mining activity has been identified in the area.	X
Technological or Manmade Hazards	Industrial and Urban Accidents	Fires	Fires could be initiated by construction related activities which impact areas adjacent to the construction activities. During construction, standard control measures would be implemented by the appointed	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			contractor to manage the risk of fire. Therefore, further consideration in the ES is not considered necessary. London City Airport is located approximately 8km east of the Proposed Scheme, as well as numerous fuel storage sites as identified above (under fuel storage and major accident hazard chemical sites). The Proposed Scheme is located in a predominantly industrial area with the nearest residential area being approximately 155m south of the Site Boundary. The Site Boundary contains nature conservation sites, Metropolitan Open Land and PRoWs. An emergency preparedness and response plan will be prepared for the Proposed Scheme which will consider the risks associated with fires impacting the Proposed Scheme and the potential for the Proposed Scheme to be an ignition source for a fire. In addition, the design of the Proposed Scheme will incorporate fire suppression systems as required.	
Technological or Manmade Hazards	Transport accidents	Road	Significant transport accidents occur across the UK on a daily basis, mainly on roads, and involving private and/or commercial vehicles. Construction: During construction there will be an increase in heavy construction plant and equipment on local road network which may increase the risk of accidents. It is not envisaged that the construction of	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			the Proposed Scheme would generate or attract any hazardous loads. Operation: **Chapter 17: Landside Transport** identifies that the anticipated operational trip attraction associated with the Proposed Scheme is not likely to require significant mitigation and enhancements to the local transport networks. On this basis, it is proposed that further assessment in the ES is not required.	
Technological or Manmade Hazards	Transport accidents	Rail	The closest railway line to the Proposed Scheme passes through Belvedere station, approximately 600m to the south. Therefore, further assessment in the ES is not required.	X
Technological or Manmade Hazards	Transport accidents	Waterways	The Proposed Scheme is located immediately adjacent to the River Thames, which carries significant water traffic and will also be used by the Proposed Scheme to transport LCO_2 and potentially hydrogen. It is also proposed to explore the potential use of the River Thames to transport some construction materials if practicable. Therefore, it is proposed to scope in this MA&D type for further consideration in the ES.	✓ C, O
Technological or Manmade Hazards	Transport accidents	Aviation	There have been no major air accidents in the UK since the Kegworth incident in 1989.	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			London City Airport is located approximately 8km to the west of the Proposed Scheme. Public safety zones (PSZ) are areas at either end of the runway and development is restricted within these zones to minimise the risk of death or injury in the event of an aircraft accident on take-off or landing. The runway at London City Airport runs west to east and the PSZ extends approximately 2km end of the runway. Therefore, the PSZ associated with the airfield will not interact or be in close proximity to the Proposed Scheme. Therefore, further consideration is not required in the ES.	
Technological or Manmade Hazards	Pollution accidents	Air	Construction: Construction impacts would be temporary for the duration of the construction phase. Increased dust emissions from construction activities and traffic could lead to potential loss of amenity at sensitive receptors. Traffic management measures may result in both positive and adverse changes to emissions from vehicle exhausts and roadside pollution concentrations. Emissions from mobile plant and equipment covered under H&S and environmental legislation. Operation: The Proposed Scheme will result in a change to the emissions of pollutants associated with the combustion of waste at Riverside 1 (currently regulated by the Environment Agency under an	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			Environmental Permit) including new pollutants (including amines and aldehydes). There will also be new pollutants associated with emissions from the Hydrogen Project and from the new backup power generators, as appropriate. The introduction of these new emission sources and pollutants will require an Environmental Permit. In the determination of the Environmental Permit, the Environment Agency will set emission limits for the new pollutants to air together with the requirement to implement appropriate mitigation measures to prevent harm to environmental receptors. Therefore, significant residual air quality effects which could result in a MA&D are not anticipated during construction and operation of the Proposed Scheme. Direct impacts on human health resulting from these air emissions have also been scoped out of the EIA, further detail is provided in **Chapter 13: Population, Health and Land Use**. Therefore, further consideration is not required in the ES.	
Technological or Manmade Hazards	Pollution accidents	Land	During construction there may be an increased risk of leaks and spillages of hazardous materials associated with the construction activities. During construction, standard control measures would be implemented by the appointed contractor and identified in the Outline CoCP to manage the risk of spillages and leaks. It is	✓ O

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			therefore proposed not to evaluate this further in the ES for the construction phase. During operation, it is understood that a range of new hazardous wastes may be generated and stored onsite before going offsite for treatment, however quantities and characteristics are not fully known at this time. Therefore, it is proposed to be scoped in for further evaluation in the ES when more information is known.	
Technological or Manmade Hazards	Pollution accidents	Water	There are several main rivers located within the Site Boundary and Study Area. These include a network of watercourses classified as main rivers within the Site Boundary and the River Thames located immediately north of the Site Boundary. There are also a number of ordinary watercourses and ponds located in the Study Area. In addition, several aquifers are present in the project area, including a Secondary Undifferentiated aquifer (superficial Alluvium), three Secondary A aquifers (the Blackheath Member (Harwich Formation), Lambeth Group, and Thanet Formation) and a Principal aquifer (Upper Chalk Formation). It is important that these water resources are protected. During construction there may increase the risk of leaks and spillages of hazardous materials associated with the construction activities. During construction, standard control measures would be implemented by the appointed contractor and identified in the Outline	✓ O

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			CoCP to manage the risk of spillages and leaks. It is therefore proposed not to evaluate this further in the ES for the construction phase. During operation, it is understood that a range of new hazardous materials may be stored onsite, however quantities and characteristics are not fully known at this time. Therefore, it is proposed to be scoped in for further evaluation in the ES when more information is known.	
Technological or Manmade Hazards	Utilities failures	Electricity	Instances of electricity failure (also referred to as power loss or blackout) can be caused by a number of things, such as severe weather (e.g. very strong winds, lightning and flooding) which damage the distribution network. These tend of be mainly specific place, local (e.g. metropolitan area) and less frequently regional (e.g. North East) as a result of severe winter storms and consequent damage to the distribution overhead line network. Riverside 1 includes infrastructure to deliver electricity to the national grid. Riverside 2 will also include similar infrastructure. Both the Carbon Capture and Storage Project and the Hydrogen Project include the installation of electrical infrastructure, including new substations, transformers and backup power generators, as appropriate. The responsibility for any diversion works and the installation of new electrical	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			infrastructure will lie with the relevant local operator or company. Information regarding diversion works will be considered in the ES, however the potential risk of construction-related incidents when undertaking diversion works as part of the Proposed Scheme would be covered by existing legislation and as such does not require further consideration in the MA&D assessment.	
Technological or Manmade Hazards	Utilities failures	Gas	Underground and above-ground gas transmission pipelines are not present across the Site Boundary, the responsibilities of which lie with the relevant local operator or company should this infrastructure fail. The potential risk of construction-related incidents when undertaking diversion works as part of the Proposed Scheme would be covered by existing legislation and as such does not require further consideration in the MA&D assessment. No natural gas use is associated with the Proposed Scheme.	X
Technological or Manmade Hazards	Utilities failures	Water supply	The London Water Resource Zone (WRZ) serves the vast majority of London, which is supplied primarily by the Rivers Thames and Lee. Some water scarcity has occurred in the River Thames. A small amount of water would be required during construction and a constant supply will be required during operation. However, in the event of water scarcity, additional supplies could be	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
			brought in by tankering, or the facility could be safely shut down until supplies are restored.	
Technological or Manmade Hazards	Utilities failures	Sewage system	The only use of the sewage system will be facilities for use by construction and operational staff, which will be covered by H&S welfare requirements. During the construction phase temporary portable systems will be in place.	X
Technological or Manmade Hazards	Malicious Attacks	Unexploded Ordnance	A low potential exists for encountering unexploded ordnance (**Ref. 19.33**) during construction of the Proposed Scheme. London was bombed heavily during WW1 and WW2. However, the majority of UXO was cleared after the war. As much of the land is brownfield land which has already been developed, the discovery of previously unidentified UXO is unlikely. Measures would be undertaken during construction to brief staff to raise awareness of this issue, and to define appropriate response strategies such this be discovered during the works. There would be a limited risk of unexploded ordnance affecting the Proposed Scheme, once operational but no greater than similar schemes in the vicinity.	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
Technological or Manmade Hazards	Malicious Attacks	Attacks Chemical Biological Radiological Nuclear	Terrorists remain interested in Chemical, Biological, Radiological and Nuclear (CBRN) materials, however alternative methods of attack such as employing firearms or conventional explosive devices remain far more likely. Historical use has been in closed densely occupied structures (underground, buildings) or targeted at specific individuals. The Proposed Scheme is unlikely to be a target for this type of event due to the low number of exposed targets.	X
Technological or Manmade Hazards	Malicious Attacks	Transport systems	Potential systems would include (but are not limited to) railways, buses, passenger ferries, cargo vessels and aircraft. The Proposed Scheme does not fall within the definition of a transport system.	X
Technological or Manmade Hazards	Malicious Attacks	Crowded places	The Proposed Scheme does not fall within the definition of a crowed place, i.e. pedestrian routes and other thoroughfares as well as sports arenas, retail outlets and entertainment spaces. The Proposed Scheme is unlikely to be a target for this type of event due to the low number of exposed targets.	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
Technological or Manmade Hazards	Malicious Attacks	Cyber	Cyber-attacks occur almost constantly on key national and commercial electronic information, control systems and digital industries. The increasing reliance on technology to control the Carbon Capture and Storage Project and the Hydrogen Project could render the Proposed Scheme more vulnerable to a cyber-attack. Notwithstanding this, it is not considered to be more vulnerable to attack than the existing baseline and similar infrastructure installed and running in the UK.	X
Technological or Manmade Hazards	Malicious Attacks	Infrastructure	Terrorists in the UK have previously attacked, or planned to attack, national infrastructure. Attempts were made to attack electricity substations in the 1990s. Bishopsgate, in the City of London, was attacked in 1993 and South Quay in London's Docklands in 1996. These attacks resulted in significant damage and disruption but relatively few casualties. The Proposed Scheme would have minimal impact on local infrastructure and is unlikely to be considered a high profile target. In addition, it is not considered to be more vulnerable to attack than other similar infrastructure in the UK.	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
Technological or Manmade Hazards	Engineering accidents and failures	Bridge failure	Bridge works are not proposed as part of the Proposed Scheme.	X
Technological or Manmade Hazards	Engineering accidents and failures	Flood defence failure	The study area associated with the Proposed Scheme benefits from flood defences, notably the Thames Barrier, which is designed to be resistant to a 1-in-1,000 year coastal flood. In addition, there are also Environment Agency maintained flood defences located along the River Thames, parts of which are within the Site Boundary. However, failure or overwhelming of the Thames Barrier and/or the Environment Agency maintained flood defences along the River Thames in an extreme event may occur. The design of the Proposed Scheme has been developed to include allowances for future climate change predictions that could result in flooding. Notwithstanding these factors, the potential risk of breach events will be considered in the ES.	✓ C, O
Technological or Manmade Hazards	Engineering accidents and failures	Mast and tower collapse	There are no towers or masts in close proximity to the Proposed Scheme or being built as part of the Proposed Scheme. The nearest towers/masts are two wind turbines: one is located approximately 500m north of the Site Boundary; and one is located approximately 655m west of the Site Boundary.	X

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In and Phase
Technological or Manmade Hazards	Engineering accidents and failures	Property or bridge demolition accidents	The Proposed Scheme may involve the demolition of a single industrial facility (Munster Joinery) which is located within the Site Boundary. The demolition of this industrial facility would be managed under the CDM Regulations and therefore further consideration is not required in the ES. The demolition of Munster Joinery would be worst-case and the Applicant would seek to relocate the business.	X
Technological or Manmade Hazards	Engineering accidents and failures	Tunnel failure / fire	There are no tunnel structures proposed as part of the Proposed Scheme or within the Study Area.	X

Note: C = Construction, O = Operation.

19.8. PROPOSED ASSESSMENT METHODOLOGY

19.8.1. The approach to the detailed assessment of the Proposed Scheme will be discussed, and agreement sought, with LBB.

19.8.2. In line with the IEMA Primer (**Ref 19.16**), for those MA&D types which have been scoped in for detailed assessment in the ES, the proposed assessment process to be used in the ES will include:

- identifying potential risk events related to the scoped in MA&D types;
- screening these risk events, e.g. to remove unrealistic worst-case scenarios;
- defining the likely worst-case consequences (impact);
- assessing the likelihood; and
- determining whether the risk event could be a MA&D and if relevant, whether the risk is ALARP with the proposed mitigation measures.

19.9. ASSESSMENT LIMITATIONS AND ASSUMPTIONS

19.9.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- The design of the Proposed Scheme will take into consideration the relevant embedded mitigation measures.
- The design of the Proposed Scheme will be subject to relevant Hazard Identification (HAZID) studies and actions identified will be integrated into the final design, to reduce risks to ALARP.
- The construction phase of the Proposed Scheme will be managed through the implementation of the construction phase plan required under the CDM Regulations 2015 and CoCP.
- The Proposed Scheme is being designed and its implementation 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 MA&D (e.g. minor leaks and spills that may be contained within the construction sites) are addressed in other topic chapters as appropriate and not in this chapter.
- 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 principal contractor.

19.10. REFERENCES

Ref 19.1: HM Government. (2017). 'The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017'. Available at: https://www.legislation.gov.uk/uksi/2017/572/contents/made

Ref 19.2: Department of Energy and Climate Change. (2011) 'Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 19.3: Department of Energy and Climate Change. (2021). 'Draft Overarching National Policy Statement for Energy (EN-1)'. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 19.4: Greater London Authority. (2021). 'The London Plan' (March 2021). Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

Ref 19.5: London Borough of Bexley. (2021). 'Draft Local Plan' (May 2021). Available at: https://www.bexley.gov.uk/sites/default/files/2021-10/Draft-local-plan-proposed-submission-document-reg-19-may-2021.pdf

Ref 19.6: HM Government. (1974). 'Health and Safety at Work etc. Act 1974'. Available at: https://www.legislation.gov.uk/ukpga/1974/37/contents

Ref 19.7: HM Government. (2015). 'The Construction (Design and Management) Regulations 2015'. Available at: https://www.legislation.gov.uk/uksi/2015/51/contents/made

Ref 19.8: HM Government. (2015). 'Control of Major Accident Hazard Regulations 2015'. Available at: https://www.legislation.gov.uk/uksi/2015/1393/made

Ref 19.9: HM Government. (2015). 'The Planning (Hazardous Substances) Regulations 2015'. Available at: https://www.legislation.gov.uk/uksi/2015/627/contents/made

Ref 19.10: HM Government. (2008). 'The Supply of Machinery (Safety) Regulations 2008'. Available at: https://www.legislation.gov.uk/uksi/2008/1597/contents/made

Ref 19.11: HM Government. (2002). 'The Dangerous Substances and Explosive Atmospheres Regulations 2002'. Available at: https://www.legislation.gov.uk/uksi/2002/2776/contents/made

Ref 19.12: HM Government. (1996 and 2016). 'The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmosphere Regulations'. Available at: https://www.legislation.gov.uk/uksi/1996/192/regulation/6/made / https://www.legislation.gov.uk/uksi/2016/1107/contents/made

Ref 19.13: HM Government. (1984). 'Occupiers Liability Act 1984'. Available at: https://www.legislation.gov.uk/ukpga/1984/3/contents

Ref 19.14: HM Government. (1996). 'The Pipelines Safety Regulations 1996'. Available at: https://www.legislation.gov.uk/uksi/1996/825/regulation/14/made

Ref 19.15: Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government. (2021). 'National Planning Practice Guidance, Healthy and Safe Communities'. Available at: https://www.gov.uk/guidance/health-and-wellbeing

Ref 19.16: Institute of Environmental Management & Assessment. (2020). 'Major Accidents and Disasters in EIA: A Primer'. Available at: https://www.iema.net/resources/blog/2020/09/23/iema-major-accidents-and-disasters-in-eia-primer

Ref 19.17: Department for Environment, Food & Rural Affairs. (2011). 'Guidelines for Environmental Risk Assessment Green Leaves III'. Available at: https://www.gov.uk/government/publications/guidelines-for-environmental-risk-assessment-and-management-green-leaves-iii

Ref 19.18: Chemical and Downstream Oil Industries Forum. (2013). 'Guideline - Environmental Risk Tolerability for COMAH Establishments'. Available at: https://www.sepa.org.uk/media/219154/cdoif_guideline__environmental_risk_assessment_v2.pdf

Ref 19.19: International Standards Organisation. (2018). 'ISO 31000:2018 Risk management – Guidelines'. Available at: https://www.iso.org/standard/65694.html

Ref 19.20: HM Government. (2020). 'Guidance: National Risk Register 2020'. Available at: https://www.gov.uk/government/publications/national-risk-register-2020

Ref 19.21: London Resilience Group. (2022). 'London Risk Register' (Version 11 February 2022) Available at: https://www.london.gov.uk/sites/default/files/london_risk_register_version_11.pdf

Ref 19.22: British Geological Survey. (2020). 'Geo Index Onshore'. Available at: http://mapapps2.bgs.ac.uk/geoindex/home.html

Ref 19.23: Prevention Web Europe. (2005). 'Tsunamis Hazard Map'. Available at: https://www.preventionweb.net/english/professional/maps/v.php?id=3831

Ref 19.24: Centre for Research on the Epidemiology of Disasters. (2009). 'The International Disaster Database'. Available at: https://www.emdat.be/

Ref 19.25: Health and Safety Executive. (2023). 'Planning Advice Web App'. Available at: https://pa.hsl.gov.uk/

Ref 19.26: Health and Safety Executive. (2023). 'COMAH 2015 Public Information Search'. Available at: https://notifications.hse.gov.uk/COMAH2015/Search.aspx

Ref 19.27: Google. (2023). Aerial and street view maps covering Study Area. Available at: https://www.google.com/maps/

Ref 19.28: International Federation of Red Cross and Red Crescent Societies. (2008). 'What is a Disaster?' Available at: http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/what-is-a-disaster/

Ref 19.29: Environment Agency. (2023). 'Flood Map for Planning'. Available at: https://flood-map-for-planning.service.gov.uk/

Ref 19.30: Greater London Authority. (2018). 'London Regional Flood Risk Appraisal 2018.' Available at: https://www.london.gov.uk/sites/default/files/regional_flood_risk_appraisal_sept_2018.pdf

Ref 19.31: Met Office. (2023). 'UK Climate Projections'. Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp

Ref 19.32: Public Health England. (2014). 'Communicable Disease Outbreak Management: Operational guidance'. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/343723/12_8_2014_CD_Outbreak_Guidance_REandCT_2__2_.pdf

Ref 19.33: Zetica UXO. (2023). 'Risk Maps'. Available at: https://zeticauxo.com/downloads-and-resources/risk-maps/

20. CUMULATIVE EFFECTS

20.1. INTRODUCTION

20.1.1. The EIA Regulations (**Ref 20.1**) require that, in assessing the effects of a particular development, consideration should also be given to the Cumulative Effects that may arise from the Proposed Scheme in conjunction with other existing and/or approved developments.

20.1.2. The ES will assess the potential for significant Cumulative Effects as a result of the Proposed Scheme in the form of a Cumulative Effects Assessment (CEA). The CEA be presented as a standalone chapter of the ES.

20.1.3. In line with Schedule 4, paragraph 5(e) of the EIA Regulations (**Ref 20.1**) 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".* Furthermore, it will address Schedule 4, paragraph 5 of the EIA Regulations (**Ref 20.1**) which states *"the description of the likely significant effects on the factors specified in regulation 4(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project, including in particular those established under Council Directive 92/43/EEC and Directive 2009/147/EC".*

20.1.4. Cumulative Effects may arise because of several different factors and combined changes. According to IEMA (**Ref 20.2**) cumulative impacts can be defined as *"the additional changes caused by a Proposed Development in conjunction with other similar developments as the combined effect of a set of developments, taken together, in practice 'effects' and 'impacts' are used interchangeably".*

20.1.5. The following types of Cumulative Effects will be considered in 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 PRoWs.
- **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.

20.2. POLICY, LEGISLATION, AND GUIDANCE

20.2.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is detailed in **Table 20-1**. The National Planning Practice Guidance 2016 has been excluded from **Table 20-1** due to a lack specific policies regarding CEA.

Table 20-1: Intra Project Effects and Cumulative Effects – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement for Energy (EN-1) 2011 (Ref 20.3)	Sets out the Government's policy for delivery of major energy infrastructure and will be the primary basis for decision making. 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 National Policy Statement (NPS) for Energy EN-1 2021 (Ref 20.4)	The Government has published a draft update to the Overarching National Policy Statement for Energy. Paragraph 1.7.4 states the key points of the Assessment of EN-1: *"[…] The energy NPSs set out mitigation for cumulative negative effects by requiring the Secretary of State to consider accumulation of effects as a whole in their decision-making on individual applications for development consent."*

Policy / Legislation / Guidance	Description
	Paragraph 4.3.2 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 4.8.6 states: *"[…] development consent applications for power CCS projects should include details of how the captured CO2 is intended to be transported and stored, how cumulative impacts will be assessed and whether any necessary consents, permits and licences have been obtained."*
National Planning Policy Framework (NPPF) 2021 (Ref 20.5)	Presents the Government's planning policies for England and how these are to be applied. Paragraph 185 from the NPPF specifically relates to Cumulative Effects and states: *"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 (Ref 20.6)	London's Spatial Development Strategy, the overall strategic plan for London. This plan sets out an integrated economic, environmental, transport and social framework for the development of London over 20-25 years. Many of these policies include specific positions and considerations for the assessment of cumulative effects.

Policy / Legislation / Guidance	Description
Bexley Council Unitary Development Plan 2004 (Ref 20.7)	Sets out Bexley Council's general policies for development and use of land throughout the borough as well as justification of these policies from a range of topics. Many of these policies includes positions on the assessment of cumulative effects.
London Borough of Bexley Draft Local Plan 2021 (Ref 20.8)	The new Local Plan is awaiting adoption and will then replace the Bexley Core Strategy and Saved UDP policies 2012. 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 new Local Plan.
Legislation	
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (Ref 20.1)	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.
The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (Ref 20.9)	These Regulations provide specific thresholds of scale to determine if a development requires EIA. Planning Inspectorate Note 17 (**Ref 20.11**) 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.
Guidance	
Demystifying Cumulative Effects, Impact Assessment	The EIA process requires the consideration of Cumulative Effects to be undertaken. However, guidance on this area of practice is often lacking,

Policy / Legislation / Guidance	Description
Outlook Journal 2020 (Ref 20.10)	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 the subject of CEA in EIA.
Planning Inspectorate Advice Note 17: Cumulative Effects Assessment (Ref 20.11)	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.

20.3. PROPOSED ASSESSMENT METHODOLOGY

20.3.1. 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 (**Ref 20.11**) which will 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.

20.3.2. 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.

INTRA-PROJECT EFFECTS

20.3.3. The assessment of Intra-project Effects will be based on the information and Study Areas within the technical chapters (**Chapter 4: Air Quality** to **Chapter 19: Major Accidents and Disasters**). 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.

20.3.4. The assessment methodology for Intra-project Effects will involve the following key stages.

Stage 1 - Screening of Sensitive Receptors

20.3.5. A screening of Sensitive Receptors (as identified in each topic 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

20.3.6. 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

20.3.7. 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.

Significance Criteria

20.3.8. The significance classifications for Intra-project Effects will be detailed in the ES.

20.3.9. If significant residual Intra-project Effects are identified, additional mitigation measures will be proposed in the ES.

INTER-PROJECT EFFECTS

20.3.10. 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 and Evaluation of Developments for Consideration

20.3.11. Stage 1 of the approach outlined in Advice Note 17 (**Ref 20.11**) requires the identification of a Zone of Influence (ZOI) for each technical topic (derived from the Study Areas in **Chapter 4: Air Quality** to **Chapter 19: Major Accidents and Disasters**) considered within the ES for the Proposed Scheme, with other, reasonably foreseeable developments identified within those ZOI. These projects are termed 'Other Developments'.

20.3.12. 'Other Developments' will be identified through an initial search, within the identified ZOI, of the: planning registers of the local planning authorities; Planning Inspectorate's planning register; and relevant development plans. Based on professional judgement, the initial search will be based on the largest practicable ZOI search area identified in technical topic chapters. This will create a 'long-list' of 'Other

Developments' for consideration (corresponding with Stage 1 in Advice Note 17 (**Ref 20.11**)).

20.3.13. Table 2 of Advice Note 17 also provides criteria to indicate the level of certainty that can be applied to each of the 'Other Developments' being implemented. **Table 20-2** has been based on Table 2 of Advice Note 17 (**Ref 20.11**). 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 20-2: Assigning Certainty to 'Other Developments' Advice Note 17

Tier	Certainty
Tier 1	• Under construction; • Permitted application(s), whether under the Planning Act (PA2008) (**Ref 20.12**) or other regimes, but not yet implemented; and • Submitted application(s) where a full ES or an equivalent has been submitted.
Tier 2	• Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report, PEIR or an equivalent has been submitted.
Tier 3	• Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report or PEIR has not been submitted. • Identified in the relevant Development Plan (and emerging Development Plans – with appropriate weight being given as they move closer to adoption) recognising that there will be limited information available on the Other Development. • Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, recognising that there will be limited information available on the 'Other Development'.

20.3.14. For the selection of 'Other Developments' the following criteria will be considered ahead of inclusion in the Long-List:

- 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 application(s) for a development that are yet determined, or refused, but are subject to appeal procedures not yet determined;
- identified in relevant development plans (and emerging development plans) which would have the characteristics of 'Other Developments'; and

- other plans and programmes (as appropriate) which set out the framework for future development consents/approvals, where such development is reasonably likely to come forward and would likely be 'Other Developments'.

20.3.15. The long-list will be sent to the relevant local planning authority/ies for comment and agreement will be sought prior to progressing to Stage 2. A draft long-list will be produced at the PEIR stage, 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'

20.3.16. Following the data collection (Stage 1) the long-list will be refined to a short-list by reviewing each of the 'Other Developments' identified against the following criteria:

- Is there a concurrent construction or operation phase between the Other Development and the Proposed Scheme?
- Is there potential that the Other Development shares some of the same Sensitive Receptors with the Proposed Scheme?
- Those Other Development 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

20.3.17. Information on Other Development(s) included within the short-list will be gathered from available third-party information sources within the public domain.

20.3.18. The information captured should include, but not necessarily limited to:

- proposed design and site boundary information;
- proposed programme of construction and operation; and
- technical information that sets out baseline data and effects arising from the Other Development on Common Receptors.

Stage 4 – Assessment of Inter-Project Effects

20.3.19. The assessment of Inter-project Effects will consider the deviation from the baseline conditions at Common Receptor(s) because of changes brought about due to the Proposed Scheme in combination with one or more Other Development(s) in the short-list. This stage corresponds with Stage 4 of Advice Note 17 (**Ref 20.11**).

20.3.20. The assessment of the Inter-project Effects will be based upon the residual effects identified in the technical topic assessments of the ES, as well as available environmental information for the Other Development(s).

20.3.21. 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.

20.3.22. 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.

20.3.23. If significant residual Inter-project Effects are identified necessary mitigation measures will be proposed in the ES.

Significance Criteria

20.3.24. 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 (**Ref. 20.11)** 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".*

20.4. LIMITATIONS AND ASSUMPTIONS

20.4.1. The following limitations and assumptions have been identified:

- The assessment of Intra-project Effects resulting from the Proposed Scheme will be focused on the residual effects from the construction and operation phases following the implementation of mitigation measures that are secured through DCO requirements or other mechanisms.
- The assessment of Inter-project Effects will be based on the interpretation and assessment of publicly available data and limited by the level of information available.
- There may be cases that Other Development screened into the short-list present information for some or most of the technical topics, but not for others. In such instances, the Inter-project Effects assessment for the given Other Development(s) may be limited to only those topics for which there is appropriate information available. However, this will be avoided where practicable with efforts made to make an assessment based upon the available information, assumptions and professional judgement. This will be stated in the ES where appropriate.
- Although information may be available for Other Developments, it may be limited in its compatibility where different assessment methodologies or criteria have been used in the technical topic assessments. Where this occurs and limits and/or prevents the Inter-project Effects assessment, it will be stated in the ES.

20.5. REFERENCES

Ref 20.1: 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

Ref 20.2: IEMA. (2020). 'Demystifying Cumulative Effects, Impact Assessment Outlook Journal'. Vol. 7. Available at: file:///C:/Users/UKDXR043/Downloads/IA-outlook-journal-vol-7.pdf

Ref 20.3: Department of Energy & Climate Change. (2011). 'Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Ref 20.4: Department of Energy and Climate Change. (2021). 'Draft Overarching National Policy Statement for Energy (EN-1)'. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf

Ref 20.5: UK Government. (2021). 'The National Planning Policy Framework (NPPF) 2021'. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

Ref 20.6: Mayor of London. (2021). 'The London Plan: The Spatial Development Strategy for Greater London'. Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

Ref 20.7: Bexley Council. (2004). 'Unitary Development Plan. Available at: https://www.bexley.gov.uk/sites/default/files/2021-12/Bexley-unitary-development-plan-written-statement-2004.pdf

Ref 20.8: London Borough of Bexley. (2021). 'Draft Local Plan: Proposed Submission Document Regulation 19 Stage'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-10/Draft-local-plan-proposed-submission-document-reg-19-may-2021.pdf

Ref 20.9: UK Government. (2017). 'The Town and Country Planning (Environmental Impact Assessment) Regulations 2017'. UK Statutory Instruments, No. 571. Available at: https://www.legislation.gov.uk/uksi/2017/571/contents/made

Ref 20.10: IEMA. (2020). 'Demystifying Cumulative Effects, Impact Assessment Outlook Journal'. Available at: https://www.iema.net/resources/reading-room/2020/07/17/impact-assessment-outlook-journal-volume-7-demystifying-cumulative-effects-july-2020

Ref 20.11: National Planning Infrastructure. (2019). 'Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects'. Version 2. Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-17/

Ref 20.12: UK Government. (2008). ‘Planning Act 2008’. Available at: https://www.legislation.gov.uk/ukpga/2008/29/contents

21. SUMMARY

21.1. SCOPE OF EIA

21.1.1. It is proposed that the following environmental topics are included in the scope of the EIA:

- Air Quality;
- Noise and Vibration;
- Terrestrial Biodiversity;
- Marine Biodiversity;
- Historic Environment;
- Townscape and Visual (including Arboriculture);
- Water Environment and Flood Risk;
- Climate Resilience;
- Greenhouse Gases;
- Socio-economics;
- Population, Health and Land Use;
- Materials and Waste;
- Ground Conditions and Soils;
- Landside Transport;
- Marine Navigation;
- Major Accidents and Disasters; and
- Cumulative Effects.

21.1.2. One environmental topic is proposed to be scoped out of the ES:

- 'Heat and Radiation', as set out in **Chapter 3: EIA Methodology**.

21.1.3. The topic-specific matters proposed to be scoped in for further assessment within the ES are detailed in **Chapters 4** to **19**. A table summarising each of the topic-specific matters proposed to be scoped out of the ES are shown in **Table 21-1** below.

Table 21-1: Impacts Scoped Out of Further Assessment

Topic	Impact	Phase
Air Quality	There are no impacts that are anticipated to be scoped out of further assessment.	
Noise and Vibration	Vibration impacts arising during the construction phase of the Proposed Scheme.	Construction
	Vibration impacts arising from construction vehicles on the surrounding road network.	
	Vibration impacts arising from the operation of the Proposed Scheme.	Operation
	Vibration impacts arising from additional traffic as a result of the operation of the Proposed Scheme.	
	Underwater noise impacts arising from additional vessel movements on marine receptors (i.e. marine mammals, hearing specialist fish species).	
Terrestrial Biodiversity	Maintenance activities.	Operation
Marine Biodiversity	Loss or disturbance of habitat (fish and marine mammals).	Construction and Operation
	Water quality and release of contaminants (marine mammals).	
	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).	

Topic	Impact	Phase
	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 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).	
	Increased wave wash (marine plants and macroalgae, fish, marine mammals and INNS).	
	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
Historic Environment	Potential temporary, construction phase effects on designated above-ground heritage assets located beyond the Site Boundary and within the Study Area.	Construction
	Setting of non-designated above-ground heritage assets located beyond the Site Boundary and within the Study Area.	
	Setting of non-designated above-ground heritage assets located beyond the Site Boundary and within the Study Area.	Operation

Topic	Impact	Phase
Townscape and Visual Impact (including Arboriculture)	Potential impacts on topography.	Construction and Operation
	Potential impacts on NCAs.	
	Potential effects on LVMF views.	
	Impacts to existing arboricultural features.	Operation
Water Environment and Flood Risk	Biological, physico-chemical and hydromorphological quality elements of the water features that are not WFD designated.	Construction and Operation
	Flood associated groundwater.	
	Impact to groundwater associated users.	
	Groundwater flooding risk.	
	Springs.	
	Groundwater Dependent Terrestrial Ecosystems (GWDTEs).	
	Groundwater quality – Thanet Sand and Lambeth Group (bedrock) Secondary A aquifer and Alluvium (superficial deposit) Secondary Undifferentiated aquifer.	Operation
Climate Resilience	Construction site, construction staff, construction materials and plant and equipment (all climate variables).	Construction

Topic	Impact	Phase
	Operation of Carbon Capture and Storage Project and Hydrogen Project (all other climate impacts excluding extreme precipitation events (flooding), extreme temperature events, gales and high winds, storms and sea level rise).	Operation
	Proposed Jetty (all other climate impacts excluding extreme precipitation events (flooding), extreme temperature events, gales and high winds, storms, sea level rise, storm surge and storm tide).	
	Ancillary infrastructure, relative humidity (change in annual average and/or evaporation).	
	Ancillary equipment (all other climate variables excluding extreme precipitation events (flooding), extreme temperature events, gales and high winds, storms, sea level rise, storm surge and storm tide).	
	End Users (all other climate variables excluding extreme precipitation events (flooding), extreme temperature events, gales and high winds, storms sea level rise, storm surge and storm tide).	
Greenhouse Gases	Disposal of Waste (A5).	Construction
	Land use, land use change and forestry (A5).	
	Operational energy use (B6).	Operation
	Land use, land use change and forestry (B8).	

Topic	Impact	Phase
	End-user Emissions (B9/D) The Carbon Capture and Storage Project (Storage)	
	Decommissioning process (C1).	End of Life
	Transport and disposal of materials (C2-4).	
Population, Health, and Land Use	Community land and assets.	Construction and Operation
	Human health.	
	Private property and housing.	
	Terrestrial businesses.	Operation
Socio-Economics	Increased demand for accommodation and community facilities due to an influx of workers.	Construction
	Crime and safety.	Construction and Operation
Materials and Waste	Impacts associated with the extraction of raw resources and the manufacture of products.	Construction and Operation
	Impacts from the transportation of material resources and waste to and from the Site Boundary.	

Topic	Impact	Phase
	Impacts on human health and controlled waters as a result of contaminated site arisings from the Proposed Scheme.	
	Consumption of material resources associated with the Proposed Scheme during operation.	Operation
	Disposal and recovery of waste associated with the Proposed Scheme beyond the first year of operation.	
Ground Conditions and Soils	Agricultural land and soils in relation to potential contamination within the underlying soils / groundwater.	Construction
	Human heath, controlled waters, building fabric and services and agricultural soils during the operation phase.	Operation
Landside Transport	Hazardous loads.	Operation
Marine Navigation	There are no matters that are anticipated to be scoped out of further assessment.	
Major Accidents and Disasters	Earthquakes (Geophysical).	Construction and Operation
	Volcanic Activity (Geophysical).	
	Landslides (Geophysical).	
	Sinkholes (Geophysical).	

Topic	Impact	Phase
	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).	

Topic	Impact	Phase
	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).	

Topic	Impact	Phase
	Displaced Population (Societal).	
	Major Accident Hazard Pipelines (Industrial and Urban Accidents).	
	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).	

Topic	Impact	Phase
	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).	
	Tunnel Failure / Fire (Engineering accidents and failures).	
	Land (Pollution accidents).	Construction
	Water (Pollution accidents).	
Cumulative Effects	There are no matters that are anticipated to be scoped out of further assessment.	

APPENDIX A – WFD SCREENING REPORT

WATER FRAMEWORK DIRECTIVE ASSESSMENT: SCOPING TEMPLATE FOR ACTIVITIES IN ESTUARINE AND COASTAL WATERS

Use this template to record the findings of the scoping stage of your Water Framework Directive (WFD) assessment for an activity in an estuary or coastal water.

If your activity will:

- take place in or affect more than one water body, complete a template for each water body; and
- include several different activities or stages as part of a larger project, complete a template for each activity as part of your overall WFD assessment.

The WFD assessment guidance for estuarine and coastal waters will help you complete the table.

Your Activity	Description, Notes or More Information
Applicant name	*WSP on behalf of Cory Environmental Holdings Limited.*
Application reference number (where applicable)	-
Name of activity	*Cory Decarbonisation Project.*
Brief description of activity	*The Applicant intends to construct, operate and maintain a decarbonisation hub on the River Thames, comprising two key projects: the Carbon Capture and Storage Project; and the Hydrogen Project. Together, the Carbon Capture and Storage Project and the Hydrogen Project are referred to as the 'Proposed Scheme'. The Proposed Scheme will also include new marine infrastructure comprising of a new marine export jetty within the River Thames and ancillary infrastructure and equipment. Further information is provided in Chapter 2: Site and Proposed Scheme Description of the attached Environmental Impact Assessment (EIA) Scoping Report.*

Your Activity	Description, Notes or More Information
Location of activity (central point XY coordinates or national grid reference)	*Approximately NGR TQ 494 807. The location of the activities will be within the Site Boundary shown on Figure 1-1 of the attached EIA Scoping Report.*
Footprint of activity (ha)	*The Site Boundary is approximately 0.6km^2 in size.*
Timings of activity (including start and finish dates)	*Construction for the Proposed Scheme is expected to start in Q1 2026 with an estimated 60-month construction programme. Table 2-1 of the attached EIA Scoping Report shows a preliminary construction programme.*
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	*Unknown at present.*
Use or release of chemicals (state which ones)	*Unknown at present.*

Water body[23]	Description, Notes or More Information
WFD water body name	*Thames Middle*
Water body ID	*GB530603911402*
River basin district name	*Tidal Thames*
Water body type (estuarine or coastal)	*Estuarine*
Water body total area (ha)	*4416.09*
Overall water body status (2019)	*Moderate*
Ecological status	*Moderate*
Chemical status	*Fail*
Target water body status and deadline	*Good - 2063*
Hydromorphology status of water body	*Not assessed; Hydromorphological designation is heavily modified*
Heavily modified water body and for what use	*The Thames Middle is designated as heavily modified with the use listed as navigation, ports and harbours. The HMWB measures identified include:* *49. Modify vessel design* *50. Vessel Management* *26. Sediment management*

[23] Water body information can be found in the Environment Agency's catchment data explorer and the water body summary table. Magic maps provide additional information on habitats and protected areas. Links to these information sources can be found in the WFD assessment guidance for estuarine and coastal waters.

Water body[23]	Description, Notes or More Information
	27. Dredge disposal site selection *28. Manage disturbance* *21. Avoid the need to dredge* *22. Dredging disposal strategy* *23. Reduce impact of dredging* *24. Reduce sediment resuspension* *25. Retime dredging or disposal*
Higher sensitivity habitats present	*Saltmarsh (A2.5) is present within 150m of the Proposed Scheme.*
Lower sensitivity habitats present	*Intertidal soft sediments (sand, mud and mixed (A2.2, A2.3, A2.4)).*
Phytoplankton status	*Good*
History of harmful algae	*Not monitored*
WFD protected areas within 2km	*No WFD protected areas within 2km of the activity.*

SPECIFIC RISK INFORMATION

Consider the potential risks of your activity to each of these receptors: hydromorphology, biology (habitats and fish), water quality and protected areas. Also consider invasive non-native species (INNS).

SECTION 1: HYDROMORPHOLOGY

Consider if hydromorphology is at risk from your activity.

Use the water body summary table to find out the hydromorphology status of the water body, if it is classed as heavily modified and for what use.

Consider if your activity:	Yes	No	Hydromorphology risk issue(s)
Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status		*WFD assessment not required.*	*The Thames Middle water body is a Heavily Modified water body and was not recorded as high status in 2019.*
Could significantly impact the hydromorphology of any water body		*WFD assessment not required.*	*Scheme RLB area less than 1% of waterbody area.*
Is in a water body that is heavily modified for the same use as your activity	*WFD assessment required.*		*The water body is designated as heavily modified with HMWB measures which reference sediment management and dredging. Therefore, the activity has been screened in for further WFD assessment as a precautionary approach.*

Record the findings for hydromorphology and go to section 2: biology.

SECTION 2: BIOLOGY

Habitats

Consider if habitats are at risk from your activity.

Use the water body summary table and Magic maps, or other sources of information if available, to find the location and size of these habitats.

Higher Sensitivity Habitats[24]	Lower Sensitivity Habitats[25]
chalk reef	*cobbles, gravel and shingle*
clam, cockle and oyster beds	*intertidal soft sediments like sand and mud*
intertidal seagrass	*rocky shore*
maerl	*subtidal boulder fields*
mussel beds, including blue and horse mussel	*subtidal rocky reef*
polychaete reef	*subtidal soft sediments like sand and mud*
saltmarsh	
subtidal kelp beds	
subtidal seagrass	

[24] Higher sensitivity habitats have a low resistance to, and recovery rate, from human pressures.
[25] Lower sensitivity habitats have a medium to high resistance to, and recovery rate from, human pressures.

Consider if the Footprint[26] of Your Activity is:	Yes	No	Biology Habitats Risk Issue(s)
0.5km^2 or larger	*Yes to one or more – requires WFD assessment.*		*The footprint of the Scheme is 0.5km^2 or larger.*
1% or more of the water body's area			*The Proposed Scheme does not cover more than 1% of the total waterbody's area.*
Within 500m of any higher sensitivity habitat			*Saltmarsh is within the Site Boundary of the Proposed Scheme. Increased wave wash from vessel traffic and release of sediment bound contaminants during dredging has the potential to adversely impact this habitat.*
1% or more of any lower sensitivity habitat			*Intertidal soft sediment (sand, mud, mixed) is located within the Site Boundary of the Proposed Scheme. Construction and operational activities could potentially result in the loss or degradation of these habitats. Activities such as dredging may cause increased sediment mobilisation and the release of sediment bound contaminants that could adversely impact these habitats.*

[26] Note that a footprint may also be a temperature or sediment plume. For dredging activity, a footprint is 1.5 times the dredge area.

Fish

Consider if fish are at risk from your activity, but only if your activity is in an estuary or could affect fish in or entering an estuary.

Consider if your activity:	Yes	No	Biology fish risk issue(s)
Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary	*Potential to impact fish.*		*The Site Boundary is located within an estuary. Construction activities such as dredging and piling, as well as operational / maintenance activities could affect fish in the estuary, and impact upstream and downstream migration. However, impacts are considered to be minimal due to the width of the section of the Thames (~675m) within the Site Boundary. Furthermore, existing levels of human activity at the Site are high due to the presence of Riverside 1 and other industrial facilities within or in close proximity to the Site Boundary, meaning that impacts are unlikely to be notably different to baseline conditions.*
Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	*Potential to impact fish behaviour.*		*The construction and operational activities, mainly piling and dredging (capital and maintenance) have the potential to impact fish behaviour through disturbance However, impacts are considered to be minimal due to the width (~675m) of the section of the Thames within the Site Boundary. Additionally, existing levels of human activity at the Site are high due to the presence of Riverside 1 and other industrial facilities within or in close proximity to the Site Boundary, meaning that impacts are unlikely to be notably different to baseline conditions.*
Could cause entrainment or impingement of fish	*Potential to impact fish.*		*Scoped in as a precaution pending design options. Further information on the design options is provided in Chapter 2: Site and Proposed Scheme Description of the attached Environmental Impact Assessment (EIA) Scoping Report.*

Record the findings for biology habitats and fish and go to section 3: water quality.

SECTION 3: WATER QUALITY

Consider if water quality is at risk from your activity.

Use the water body summary table to find information on phytoplankton status and harmful algae.

Consider if your activity:	Yes	No	Water quality risk issue(s)
Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	*Requires WFD assessment.*		*Scoped in as a precaution pending design options.*
Is in a water body with a phytoplankton status of moderate, poor or bad		*WFD assessment not required.*	*Phytoplankton status Good (2019).*
Is in a water body with a history of harmful algae	*Requires WFD assessment.*		*Scoped in as a precaution pending design options. Waterbody not currently monitored for harmful algae.*

Consider if water quality is at risk from your activity through the use, release or disturbance of chemicals.

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Yes[27]	No	Water quality risk issue(s)
The chemicals are on the Environmental Quality Standards Directive (EQSD) list	*Requires WFD assessment.*		*Scoped in as a precaution pending design options.*
It disturbs sediment with contaminants above Cefas Action Level 1	*Requires WFD assessment.*		*Scoped in as a precaution pending design options.*

If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:	Yes	No	Water quality risk issue(s)
The chemicals released are on the Environmental Quality Standards Directive (EQSD) list	Requires *WFD assessment.*		*Scoped in as a precaution pending design options.*

Record the findings for water quality go on to section 4: WFD protected areas.

[27] Carry out your impact assessment using the Environment Agency's surface water pollution risk assessment guidance, part of Environmental Permitting Regulations guidance.

SECTION 4: WFD PROTECTED AREAS

Consider if WFD protected areas are at risk from your activity. These include:

- special areas of conservation (SAC)
- special protection areas (SPA)
- shellfish waters
- bathing waters
- nutrient sensitive areas

Use Magic maps to find information on the location of protected areas in your water body (and adjacent water bodies) within 2km of your activity.

Consider if your activity is:	Yes	No	Protected areas risk issue(s)
Within 2km of any WFD protected area[28]		*WFD assessment not required.*	*No WFD protected areas within 2km of activity.*

Record the findings for WFD protected areas and go to section 5: invasive non-native species.

SECTION 5: INVASIVE NON-NATIVE SPECIES (INNS)

Consider if there is a risk your activity could introduce or spread INNS.

Risks of introducing or spreading INNS include:

- materials or equipment that have come from, had use in or travelled through other water bodies; and
- activities that help spread existing INNS, either within the immediate water body or other water bodies.

[28] Note that a regulator can extend the 2km boundary if your activity has an especially high environmental risk.

Consider if your activity could:	Yes	No	INNS risk issue(s)
Introduce or spread INNS	*Requires WFD assessment.*		*Dependent upon the port of origin of works vessels, the Proposed Scheme has the potential to introduce INNS to the Thames.*

Record the findings for INNS and go to the summary section.

SUMMARY

Summarise the results of scoping here.

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	*Yes*	*Potential activities scoped in as a precaution pending design options.*
Biology: habitats	*Yes*	*Potential activities scoped in as a precaution pending design options.*
Biology: fish	*Yes*	*Potential activities scoped in as a precaution pending design options.*
Water quality	*Yes*	*Potential activities scoped in as a precaution pending design options.*
Protected areas	*No*	*No WFD protected areas within 2km of activity.*
Invasive non-native species	*Yes*	*Potential activities scoped in as a precaution pending design options.*
Phytoplankton	*No*	*Due to the highly turbid nature of the Thames and the potential construction and operational activities, it is unlikely there will be any issues to phytoplankton.*

If you haven’t identified any receptors at risk during scoping, you don’t need to continue to the impact assessment stage and your WFD assessment is complete.

If you’ve identified one or more receptors at risk during scoping, you should continue to the impact assessment stage.

Include your scoping results in the WFD assessment document you send to your activity’s regulator as part of your application for permission to carry out the activity.