LIGHTHOUSE GREEN FUELS DCO

Environmental Impact Assessment Scoping Report Main Text and Figures

PINS Reference: **EN010150**

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Volume 1

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GLOSSARY

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.
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.
Adaptive Capacity	The capacity of receptors to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.
Additional Mitigation	Actions that will require further activity to achieve the anticipated outcome. These may be imposed as part of the Development Consent Order, or through inclusion in the Environmental Statement .
Agricultural Land	Land devoted to agriculture particularly rearing livestock and the production of crops.
Agricultural Land Classification (ALC)	A framework for determining the physical quality of the land at national, regional and local levels. This is based on the long term physical limitations of land for agricultural use. There are a number of factors that affect the grade and the main ones are climate, site and soil characteristics, and the interactions between them.
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.
Alcohol-to-Jet (AtJ)	A process for the conversion of alcohols to an alternative jet fuel blend stock based on catalytic steps historically utilised by the petroleum refining and petrochemical industry.
Alfanar	A company that specialises in developing and investing in renewable energy projects and is the parent company to the Applicant.

Term	Definition
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 woodland.
Applicant	Lighthouse Green Fuels Ltd
Aquifer	Underground layer of water-bearing permeable rock, rock fractures or unconsolidated materials (gravel, sand, or silt).
Artificial Ground	Artificial ground relates to the areas where ground surface has been significantly modified by human activity
Baseline	A reference level of existing environmental conditions against which a development is measured and controlled.
Best and most versatile agricultural land (BMV)	Defined as Grades 1, 2 and 3a by the National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG). This is the land that is determined to be most flexible, productive and efficient in response to inputs and which can best deliver future crops for food and non-food uses such as biomass, fibres and pharmaceuticals. Grades 3b, 4, and 5 are used to classify land that is of moderate quality to very poor quality.
Best Available Techniques (BAT)	The available techniques which are the best for preventing or minimising emissions and impacts on the environment.
Biodiversity	The biological diversity of the earth's living resources. The total range of variability among systems and organisms at the following levels of organisation: bioregional, landscape, ecosystem, habitats, communities, species, populations, individuals, genes, and the structural and functional relationships within and between these different levels.
Biodiversity Net Gain (BNG) Assessment	A BNG Assessment compares baseline conditions to post-development plans. BNG is achieved if the post-development plans provide a net improvement to the biodiversity of a site.
British Geological Survey	Provider of objective and authoritative geoscientific data, information and knowledge for the UK.

Term	Definition
Carbon Capture	The capture of carbon dioxide that would otherwise be emitted into the atmosphere from industrial sources.
Carbon Capture and Storage (CCS)	The capture and subsequent storage of carbon dioxide that would otherwise be emitted into the atmosphere from industrial sources.
Climate Change	Large-scale, long-term shift in the Earth's weather patterns or average temperature.
Combined Cycle Gas Turbine (CCGT) Power Plant	An electrical power plant in which a gas turbine and steam turbine are used in combination to generate power, achieving a greater efficiency than would be done so independently.
Consultation Zone	The Health and Saftey Executive (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 duty to consult the HSE on certain proposed developments within that consultation zone.
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 section 104 of the Water Resources Act 1991.
Cumulative Effects	The effects of the Proposed Scheme in cumulation with other existing development and/or approved development.
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10-5Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

Term	Definition
DCO Application	The application for development consent that will be submitted by the Applicant.
Decommissioning Phase	Is the process of shutting down a building and/or removing it from operation or use.
Designated Heritage Assets	Designation highlights a building, site or area's special interest and value to this and future generations. It gives protection under law or policy to manage, enjoy and celebrate England's historic buildings, parks, monuments, gardens, wreck sites and battlefields.
Development Consent Order (DCO)	A Statutory Instrument (SI) made by the Secretary of State (SoS) pursuant to the 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).
External Influencing Factor	A factor that occurs beyond the Site 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.
Feedstock	Raw materials used to supply or fuel a process or machine.
Fischer-Tropsch (FT)	The process intended to be utilised by the Proposed Scheme to create Sustainable Aviation Fuel (SAF).

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)	As 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	This zone comprises land which would naturally flood with an annual probability of 1 in 20 (5%) or greater in any year, and 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.
Fluvial	Of, or relating to, or inhabiting a river or stream.
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 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

Term	Definition
	commonly expressed in terms of 'carbon dioxide equivalents' (CO_2e) according to their relative global warming potential.
Green Naphtha	An associated product of the sustainable aviation fuel production process.
Ground Investigation	The physical investigation which can include a Geotechnical Survey, Geophysical Surveys and Geo-Environmental Surveys. Comprised of targeted investigations including both intrusive and non-intrusive techniques to prove ground conditions, determine soil / rock parameters, chemical/asbestos concentrations and identify hazards associated with the ground conditions to inform a proposed development.
Groundwater	Groundwater is the store of water present beneath Earth's surface in rock and soil pore spaces and in the fractures of rock formations.
Groundwater Flooding	Groundwater flooding is defined as the emergence of groundwater at the ground surface away from perennial river channels or the rising of groundwater into man-made ground, under conditions where the normal ranges of groundwater level and flow are exceeded.
Groundwater Vulnerability	Assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one-kilometre square grid.
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 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

Term	Definition
	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.
Hazard	Anything with the potential to cause harm, including ill-health and injury, damage to property or the environment; or a combination of these.
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 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.
Internal Drainage Board (IDB)	A type of local public authority that manages water levels in England where there is a special need for drainage. IDBs undertake works to reduce flood risk to people, property and infrastructure, and manage water levels for agricultural and environmental needs.

Term	Definition
Internal Influencing Factor	A factor which occurs within the Site that may present a risk to the Proposed Scheme.
L_{Aeq}	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 dB.
$L_{Aeq,T}$	Defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.
$L_{Aeq,16h}$	The annual average noise level (in dB) for the 16-hour period between 0700-2300.
L_{Amax}	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 Cover	The surface cover of the land, usually expressed in terms of vegetation cover or lack of it. Related to, but not the same as, land use.
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.
Landscape and Visual Impact Assessment (LVIA)	A tool used to identify and assess the likely significance of the effects of change resulting from development both on the landscape as an environmental resource in its own right and on people's views and visual amenity.
Landscape character	A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse.

Term	Definition
Landscape Character Assessment (LCA)	The process of identifying and describing variation in the character of the landscape, and using this information to assist in managing change in the landscape. It seeks to identify and explain the unique combination of elements and features that make landscapes distinctive. The process results in the production of a Landscape Character Assessment.
Landscape receptors	Defined aspects of the landscape resource that have the potential to be affected by a proposal.
Landscape value	The relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a whole variety of reasons.
Lead Local Flood Authority (LLFA)	Local Authority responsible for 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.
L_{night}	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.
Lower Super Output Area (LSOA)	Lower layer Super Output Areas (LSOAs) are made up of usually four or five Output Areas (the lowest level of geographical area for census

Term	Definition
	statistics), comprising of between 400 and 1,200 households with a resident population between 1,000 and 3,000 persons.
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.
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.
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.
MA&D	Major Accident and Disasters
MA&D Category	A set of values used to categorise events within a related parent MA&D Group.
MA&D Group	A MA&D which can be grouped as either a Natural Hazard (Disaster) or Technological or Manmade Hazard (Major Accident).

Term	Definition
MA&D Type	A set of values used to sub-categorise events within a MA&D Category.
Mitigation Measures	Actions proposed to prevent, reduce, and where possible offset, significant adverse effects arising from the whole or specific elements of the Proposed Scheme.
National Nature Reserve (NNR)	A site of importance for wildlife, geology, education, or public enjoyment.
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.
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.
Nitrate Vulnerable Zone (NVZ)	This dataset sets out the NVZ designations following the 4 yearly review for implementation in 2017. These are the final designations following appeals. NVZs are areas designated as being at risk from agricultural nitrate pollution. The designations are made in accordance with the Nitrate Pollution Prevention Regulations 2015. Waters are defined within the Nitrates Direction as polluted if they contain or could contain, if preventative action is not taken, nitrate concentrations greater than 50mg/L.
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.

Term	Definition
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-native Invasive Species (NNIS)	An invasive non-native species is any living thing which has spread outside its native range and causes environmental and/or economic harm in its new environment.
Non-Statutory Consultation	Consultation with stakeholders on the Proposed Scheme which occurs in addition to the Statutory Consultation required under the PA2008 and EIA Regulations.
Non-Statutory Consultees	Consultees who, whilst not designated in law, are likely to have an interest in a proposed development and should therefore be consulted on the Proposed Scheme.
Operation Phase	If permission is granted, 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, or Internal Drainage Board where relevant, has powers for Ordinary Watercourses that are similar to those held by the Environment Agency for Main Rivers.
Ordnance Survey (OS)	Great Britain's national mapping agency.
Outline Code of Construction Practice (CoCP)	Outline 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.
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

Term	Definition
	view of the likely significant effects of the development (and of any associated development) is presented within this specific report.
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.
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.
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

Term	Definition
	may be restricted (i.e. foot, horse 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.
Regionally Important Geological Sites (RIGSs)	Sites of regional and local importance for their geology that have not been designated a Site of Special Scientific Interest.
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.
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.
SAF Plant Site	The area within the Site where the main SAF Plant will be constructed.
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 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.

Term	Definition
	These are generally the water-bearing parts of the former non-aquifers. The term
Secondary Undifferentiated Aquifer	Assigned 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 (SNZ).
Self-propelled modular transporters (SPMTs)	A heavy hauler vehicle used for transporting large objects.
Sens Slope statistic	A method for estimating the slope of a regression line that fits a set of (x, y) data elements based on a least-squares estimate.
Sensitivity	A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development proposed and the value related to that receptor.
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 by the Proposed DCO Application Boundary on **Figure 1-1**.
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 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.

Term	Definition
Solid Recovered Fuel (SRF)	A fossil fuel alternative produced from commercial and industrial waste.
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.
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.
SPZ Outer Protection Zone (Zone 2)	Defined by a 400 day travel time from a point below the water table. The previous methodology gave an option to define SPZ2 as the minimum recharge area required to support 25 per cent of the protected yield. This option is no longer available in defining new SPZs and instead this zone has a minimum radius of 250 or 500 metres around the source, depending on the size of the abstraction
SPZ Total Catchment (Zone 3)	Defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source. In confined aquifers, the source catchment may be displaced some distance from the source. For heavily exploited aquifers, the final Source Catchment Protection Zone can be defined as the whole aquifer recharge area where the ratio of groundwater abstraction to aquifer recharge (average recharge multiplied by outcrop area) is >0.75. There is still the need to define individual source protection areas to assist operators in catchment management.
Special Area of Conservation (SAC)	High quality conservation sites that are protected under the European Union Habitats Directive, due to their contribution to conserving those habitat types that are considered to be most in need of conservation.
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.

Term	Definition
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.
Standard of Protection (SoP)	The SoP that a flood defence offer is expressed in terms of the likelihood of a particular flood event (or level) being equalled or exceeded in any given year. Therefore, if a flood defence offers a SoP of 1 in 50, it will take a 1 in 50 (or greater) flood event to overtop or bypass it.
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.
Superficial Deposits	Superficial deposits are the youngest geological deposits formed during the most recent period of geological time, the Quaternary, which extends back about 2.6 million years from the present. They rest on older deposits or rocks referred to as bedrock.
Susceptibility	The ability of a defined landscape or visual receptor to accommodate the specific proposed development without undue negative consequences.
Sustainable Aviation Fuel (SAF) Synthetic Paraffinic Kerosene (SPK)	SAF/SPK is a biofuel used to power aircraft that has similar properties to conventional jet fuel but with a smaller carbon footprint.
Technological Readiness Level (TRL)	Technological Readiness Level (TRL)
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.
Tertiary Mitigation Measures	Actions that would occur with or without input from the EIA feeding into the design process.
Unproductive Strata	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

Term	Definition
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.
Vulnerability	In the context of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (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.
Waste Hierarchy	Sets out the priorities that must be applied when managing waste.
Water Framework Directive (WFD)	European Union directive which commits member states to achieve good qualitative status of all water bodies. This has been retained in UK law following the UK's exit from the European Union.
Waterbody	A discrete body of water forming a physical feature.
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.

1. INTRODUCTION

1.1. BACKGROUND

THE APPLICANT

1.1.1. Lighthouse Green Fuels Ltd (LGF) (herein known as 'the Applicant') is wholly owned by Alfanar Global Development Company ('Alfanar'). Alfanar is a global project development, manufacturing, and engineering company founded in 1976 and headquartered in Saudi Arabia, with a presence in 24 countries, mainly in the Middle East, Asia, Africa, and Europe. The group turnover is more than US$2.5 billion annually and it employs more than 18,000 people, including 2,000 engineers. LGF has developed significant in-house waste-to-Sustainable Aviation Fuel (SAF) expertise, and also has experience developing renewable projects and providing turnkey Engineering, Procurement and Construction ('EPC') contractor services. This experience will be utilised to successfully construct and operate the LGF Project (the 'Proposed Scheme').

1.1.2. The Proposed Scheme represents a ~£1.2 billion investment in domestic SAF production within the UK with the development of a 'waste-to-sustainable aviation fuel' facility in Teesside with on-site generating station capacity of up to 150 MW. The facility will treat Solid Recovered Fuel (SRF) and/or waste biomass and convert it to various energy-related products, including sustainable aviation fuel and naphtha.

1.1.3. It is anticipated that 235 full-time employees (FTEs) will be created by the Proposed Scheme, with an additional 640 direct and indirect FTEs from associated infrastructure, with a further 750 temporary construction staff anticipated during the construction phase.

1.1.4. Development of domestic SAF production will bring significant economic benefit to the UK; the Gross Value Added (GVA) arising from the Project is estimated to be in excess of £470m. In addition to the Proposed Scheme, LGF has plans for additional SAF facilities within the UK.

OVERVIEW

1.1.5. The Applicant is planning to submit an application for a Development Consent Order (DCO) to construct, operate and decommission the Proposed Scheme on land at Port Clarence, near Stockton-on-Tees, Teesside (the 'Site'). The Proposed Scheme is anticipated to be the UK's first commercial scale waste-to-SAF project to be constructed and would comprise the following key elements which are considered in this Scoping Report:

- SAF Plant;
- Feedstock Processing and Storage Area;
- Bulk Liquid Storage (for SAF and Naphtha);

- Pipeline and cable connections (import and export) and Utility Corridors;
- Flares;
- Internal Heavy Haul Road (for construction phase only);
- Internal Conveying Corridors;
- Rail Terminal; and
- Marine Transport Infrastructure (for construction and operational purposes).

1.1.6. The location and extent of the Proposed Scheme can be seen on **Figure 1-1** and **Figure 1-2**. The elements of the Proposed Scheme listed above are described in detail in **Chapter 2: Site and Proposed Scheme Description**.

BACKGROUND TO THE PROPOSED SCHEME

1.1.7. Following the successful development of large-scale renewable energy projects globally (i.e. wind and solar), the Applicant is now focusing its group efforts on projects to decarbonise transport and, in particular, the decarbonisation of aviation. The Proposed Scheme is the Applicant's flagship decarbonisation project, and it will be located in Teesside.

1.1.8. Transport decarbonisation is one of the most significant challenges in achieving Net Zero ambitions. Decarbonisation of aviation, unlike other forms of transport, faces a bigger challenge. Several decarbonisation routes have been proposed, however, SAF presents the only currently viable near, mid- and long-term solution, offering significant greenhouse gas savings, whilst also being capable of being used within the existing distribution, storage and refuelling infrastructure for aviation.

1.1.9. Global demand for SAF is expected to grow at near exponential rates towards 2050 as countries across the world strive to achieve Net Zero. Demand is expected to reach between 330 – 445 million tonnes per annum (Mtpa) by 2050 (**Ref 1.1**).

1.1.10. Currently the UK uses approximately 12 Mtpa of aviation fuel (2019 data). To meet the UK's ambitions of 10% SAF uptake by 2030,1.2 Mtpa of low carbon SAF are required. This equates to ~14 plants of similar size to the Proposed Scheme being required to meet the demand. The Applicant believes that this demand is best met by domestic SAF production plants, rather than relying on costly imports.

1.1.11. The Applicant also considers that the UK is ideally placed as a key global aviation hub with access to permanent geological carbon stores and these benefits should be leveraged to allow the UK to become a world-leader in the production of low carbon SAF. The growing market for SAF, alongside regulatory and Governmental support, has created an attractive location to construct large-scale SAF facilities within the UK.

DO NOT SCALE

Information Classification:
PUBLIC
Information that is available to the general public and is intended for distrubution outside WSP.

Key

PROPOSED DCO APPLICATION BOUNDARY

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

APPLICANT: Lighthouse Green Fuels Ltd

PROJECT: Lighthouse Green Fuels

TITLE: Figure 1.1
Proposed DCO Application Boundary

SCALE:	CHECKED:	APPROVED:
	AR	JK

PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442	SA	SA	7/11/2023

DRAWING No: 70102442-WSP-RP-ES-0102 REV: 2

0 100 500 1000
SCALE (m)

DO NOT SCALE

Information Classification:
PUBLIC
Information that is available to the general public and is intended for distrubution outside WSP.

Key

- PROPOSED DCO APPLICATION BOUNDARY
- LIGHTHOUSE GREEN FUELS SAF PLANT
- FEEDSTOCK STORAGE AREA
- PIPELINE CORRIDORS
- BULK LIQUID STORAGE (SAF/NAPHTHA)
- FEEDSTOCK PROCESSING
- AIR SEPARATION UNIT
- CONSTRUCTION LAYDOWN/ PERMANENT PARKING
- MOF / HEAVY HAUL ROAD
- CONVEYOR CORRIDOR
- RAIL TERMINAL
- JETTIES

Wilton Engineering Wharf

Clarence Wharf

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

0 100 500 1000
SCALE (m)

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

APPLICANT: Lighthouse Green Fuels Ltd

PROJECT: Lighthouse Green Fuels

TITLE: Figure 1.2 Proposed Scheme Layout

SCALE:	CHECKED:	APPROVED:
	AR	JK

PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442	SA	SA	7/11/2023

DRAWING No: 70102442-WSP-RP-ES-0102 REV: 2

1.2. REQUIREMENT FOR DEVELOPMENT CONSENT

1.2.1. Part 3 of the Planning Act 2008 defines what projects constitute Nationally Significant Infrastructure Projects (NSIPs). Once classed as an NSIP, development consent is required under Part 4 of the Act. The Proposed Scheme does not automatically fall under the definition of NSIP as the associated schemes to the main gasification facility do not fall under the definition of NSIP.

1.2.2. Therefore, on the 7 October 2022, the Applicant formally requested a direction by the Secretary of State for Business, Energy and Industrial Strategy (SoS), (now the Secretary of State for Energy Security & Net Zero) pursuant under Section 35(1) of the Planning Act 2008 (as amended) ('2008 Act') (**Ref 1.2**) that f the Proposed Scheme be treated as a nationally significant infrastructure project for which development consent is required.

1.2.3. The SoS, in his letter dated 25th October 2022, directed that the Proposed Scheme should be considered a development of national significance and would require development consent. The SoS is satisfied that (**Ref 1.3**):

- *"The Proposed Development is in the field of energy and development;*
- *The Proposed Development will be wholly within England and waters adjacent to England up to the seaward limits of the territorial sea and the Renewable Energy Zone when completed;*
- *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*
- *The Applicant's request constitutes a "qualifying request" in accordance with section 35ZA(11) of the Planning Act 2008."*

1.2.4. In coming to this conclusion, the SoS recognised that *"the Proposed Development is nationally significant; the reasons for this are included [below]:*

- *The Proposed Development will use waste which it converts into energy / energy vectors;*
- *From the gasification and related processes the Proposed Development will produce:*
    1. Sustainable Aviation Fuel (FT-SPK) to power aeroplanes, which is an energy vector to be used in the aviation industry as an alternative to kerosene fuel;
    2. Off-gases for energy generation purposes – the Fischer-Tropsch process also produces off-gases which are then directed to one of the two gas turbines within the on-site 150MW CCGT generation station, to produce electricity for the on-site processes;
    3. Naphtha for energy generation purposes – the Applicant anticipates that the second gas turbine within the generating station will be fired on on-site product

liquid naphtha – approximately 50% of the produced naphtha will be used for this power generation purposes;

- On 19 July 2022 the government published its Jet Zero Strategy which sets out how the UK will achieve net zero in the aviation industry by 2050. The document also explains the 'critical role [aviation] plays in boosting trade, tourism and travel' in the UK. The Strategy states: sustainable aviation fuels are a key lever to accelerate the transition to Jet Zero, and represent an industrial leadership opportunity for the UK. The Proposed Development will make an important contribution to the aims set out in the Jet Zero Strategy;
- The urgent development of sustainable aviation fuel- producing facilities, like the Proposed Development, is of national and international significance in the pursuit of aviation sector decarbonisation to help the UK meet its statutory obligation to achieve net zero by 2050."

1.3. REQUIREMENT FOR EIA

1.3.1. The process and content of an Environmental Impact Assessment (EIA) is summarised in Regulation 5 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('EIA Regulations') (**Ref 1.4**). 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.

1.3.2. Regulation 4 of the EIA prohibits the grant of consent for NSIPs that falls under the definition of an "EIA development" without consideration of specific environmental information and processes set out in Regulation 5.

1.3.3. The Proposed Scheme involves the construction and operation of a waste to energy generation plant and so is deemed to constitute EIA development and to require EIA (as per Schedule 1(10) for *'Waste disposal installations for the incineration or chemical treatment (as defined in Annex I to Directive 2008/98/EC under heading D9) of non-hazardous waste with a capacity exceeding 100 tonnes a day'*). As the Proposed Scheme requires development consent pursuant to the 2008 Act, the processes set out, and documents stated within The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended) (2009 Regulations) (**Ref 1.5**) must be followed and prepared. This includes "*the environmental statement required … and any scoping or screening opinions or directions*".

1.3.4. A Regulation 8 (of the EIA Regulations) (**Ref 1.6**) notification 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 Q2 2024.

1.4. NATIONAL POLICY STATEMENTS

1.4.1. Under the Planning Act 2008 regime (**Ref 1.1**), the policy framework for examining and determining applications for development consent is provided by National Policy Statement (NPSs). Section 5 of the 2008 Act allows the relevant SoS to designate NPSs setting out national policy in relation to the types of Nationally Significant Infrastructure Projects (NSIPs) listed at Section 14 of the Act. The NPSs are the primary policy used by the relevant SoS to examine and determine applications for NSIPs. Further details on NPSs can be found in **Chapter 4: Planning and Energy Policy** and in the Policy, Legislation and Guidance sections of **Chapters 5-21**.

1.5. PURPOSE OF THE EIA SCOPING REPORT

1.5.1. 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 1.7**).

1.5.2. 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.

1.5.3. The following topics are contained within this EIA Scoping Report. In addition, **Chapter 22: Summary**, contains details of the elements of those topics scoped into the EIA and those elements scoped out:

- Chapter 5: Air Quality;
- Chapter 6: Noise and Vibration;
- Chapter 7: Terrestrial Ecology;
- Chapter 8: Freshwater and Marine Ecology;
- Chapter 9: Water Environment and Flood Risk;
- Chapter 10: Landscape and Visual;
- Chapter 11: Cultural Heritage;
- Chapter 12: Greenhouse Gases
- Chapter 13: Climate Change Resilience;
- Chapter 14: Materials and Waste;
- Chapter 15: Socioeconomics;
- Chapter 16: Population and Human Health;
- Chapter 17: Geology and Soils;
- Chapter 18: Traffic and Transport;
- Chapter 19: Major Accidents and Disasters;
- Chapter 20: Marine Navigation; and
- Chapter 21: Cumulative Effects.

1.5.4. The EIA Regulations (Regulation 10(3)) prescribe the information that a request for an EIA Scoping Opinion must include (**Ref 1.8**). **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 a Scoping Opinion

Information Required	Location within this Report
A plan sufficient to identify the land	Figure 1-1: Proposed DCO Application Boundary Figure 1-2: Proposed Scheme Layout Figure 2-1: SAF Plant Layout
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 5-21 of this Report

1.5.10. In addition to the above, Regulation 10(3) of the EIA Regulations also required "*such other information or representation 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: Approach to EIA
The approach to dealing with alternatives.	Chapter 3: Approach to EIA
The approach to undertaking the cumulative assessment.	Chapter 21: 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 in') and the aspects and maters not requiring further consideration (i.e., 'scoped out').	Chapters 3, 4 and Chapters 5-22 of this Report
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: Approach to EIA

1.5.19. 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 provide information that enables interested parties, including members of the public, local authorities and statutory bodies, to understand the likely environmental effects so that they can provide meaningful feedback; and
- The PEIR will be followed by the ES, which will be produced 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, the proposed mitigation measures to be implemented and the residual effects anticipated to arise following the implementation of that mitigation.

1.6. REFERENCES

Ref 1.1: Air Transport Action Group (2021) 'Fueling Net Zero: How the aviation industry can deploy sufficient sustainable aviation fuel to meet climate ambitions'. Available at: https://aviationbenefits.org/media/167495/fueling-net-zero_september-2021.pdf

Ref 1.2: 'UK Government (2008) Planning Act 2008'. Available at: https://www.legislation.gov.uk/ukpga/2008/29/contents

Ref 1.3: 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 Lighthouse Green Fuels Project. Available at: https://www.gov.uk/government/publications/lighthouse-green-fuels-project-waste-to-sustainable-aviation-fuel-section-35-direction-planning-act-2008

Ref 1.4: UK Government (2017). 'Regulation 5 of the EIA Regulations'. Available at: https://www.legislation.gov.uk/uksi/2017/572/contents/made

Ref 1.5: UK Government (2009) 'The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009. Available at: https://www.legislation.gov.uk/uksi/2009/2264/contents/made

Ref 1.6: UK Government (2017). 'Regulation 8 (of the EIA Regulations)'. Available at: https://www.legislation.gov.uk/uksi/2017/572/contents/made

Ref 1.7: 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 1.8: UK Government (2017). 'Regulation 10 of the EIA Regulations'. Available at:

https://www.legislation.gov.uk/uksi/2017/572/contents/made

2. SITE AND PROPOSED SCHEME DESCRIPTION

2.1. SITE DESCRIPTION

2.1.1. The Site (defined as the Order Limits of the Proposed DCO Application Boundary shown in **Figure 1-1**) lies fully within the administrative area of Stockton-on-Tees Borough Council. The Site comprises approximately 205.66 hectares (ha) in area. The indicative layout of the Proposed Scheme within the Site is shown in **Figure 1-2**.

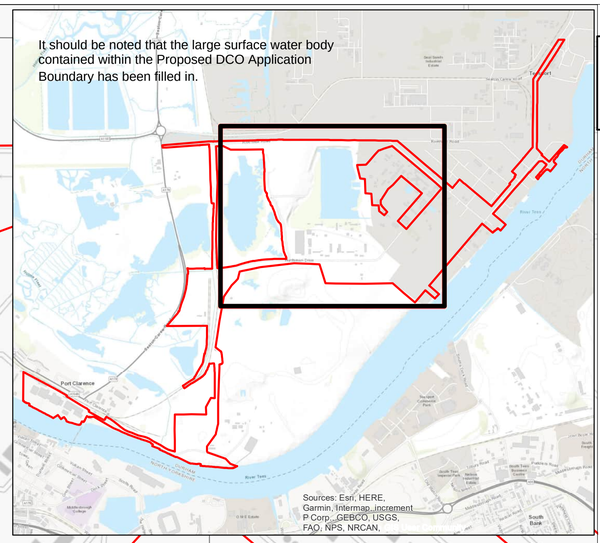
2.1.2. An area (defined as the area within the Site assigned for the Sustainable Aviation Fuel (SAF) Plant shown in **Figure 2-1**) was partially developed by Air Products Plc pursuant to planning permissions for energy generation facilities (using plasma gasification technology) granted in 2011 (11/0359/EIS) and 2013 (13/0780/EIS). Air Products Plc developed part of the Site (previously referred to as TV1) and were in the process of developing a second adjacent part of the Site (previously referred to as TV2) until construction works were suspended in November 2015. In April 2016 Air Products Plc announced that it would be exiting the energy from waste market in the UK and that the TV1 and TV2 sites would not be progressed. The area designated as the SAF Plant Site remains subject to those extant partially implemented planning permissions (as varied and amended).

2.1.3. Adjacent and to the west of the TV1 and TV2 facilities the SAF Plant Site contains an operational Materials Recovery Facility (MRF), operated by the N + P Group. The north of the Site consists of unutilised brownfield land, consisting of areas for car parking and hardstanding tracks. The Proposed Scheme would be constructed on the footprint of the TV1 and TV2 sites, as well as on land surrounding these sites (see **Figure 1-2**).

2.1.4. In 2018, the Applicant acquired the SAF Plant Site and a plan was made to redevelop it to create a facility capable of producing liquid fuels from waste. The Site was considered suitable due to the above described previous uses and existing permissions, the existing on-site infrastructure and services, the proximity of the area designated for the SAF Plant Site to key supporting and complementary infrastructure within the Teesside region, and the potential for use of rail and water transport to move products into and out of the Site. The Applicant is currently exploring all potential logistical options and this may include land and facilities within third party ownership. This is outlined in **Section 2.2** and **Table 2-2** below with the options to be refined as engineering and logistical studies continue.

N

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.



Huntsman Dr

Riverside Rd

0 65 130 260 390 520

SCALE (m)

DO NOT SCALE

Information Classification:
PUBLIC
Information that is available to the general public and is intended for distrubution outside WSP.

Key

Proposed DCO Application Boundary

Unit Description

- 1 - Gasification
- 2 - Syngas Compression and Clean-up
- 3 - FT Synthesis
- 4 - Upgrading
- 5 - Flare Area
- 6 - Auxiliary POX
- 7 - Carbon Capture Unit
- 8 - Thermal Oxidiser
- 9 - Utilities 1
- 10 - Utilities 2 (CW)
- 11 - Wastewater Treatment Plant
- 12 - Surface Water Pond
- 13 - Miscellaneous Tankage
- 14 - Powerplant
- 15 - Substation 1 & ancilliary equipment
- 16 - Substation 2 & ancillary equipment
- 17 - Sub-station 3 & ancilliary equipment
- 18 - Maintenance / Laydown / TAR 1
- 19 - Maintenance / Laydown / TAR 2
- 20 - Air Separation Unit
- 21 - Feedstock Silos
- 22 - Intermediate Feedstock Storage
- 23 - General Administration Facilities
- 24 - Process Waste Storage

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

APPLICANT: Lighthouse Green Fuels Ltd

PROJECT: Lighthouse Green Fuels

TITLE: Figure 2.1
DCO SAF Plant Layout

SCALE @ A1:	CHECKED:		APPROVED:
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PROJECT No:	**DESIGNED:**	**DRAWN:**	**DATE:**
70102442	SA	SA	7/18/2023

DRAWING No: 70102442-WSP-RP-ES-0201 REV: 2

SURROUNDING AREA

2.1.5. **Figure 2-2** provides details of environmental and social constraints within and surrounding the Site. An overview of the surrounding area is provided below:

2.1.6. The Site is surrounded by many existing and operational industrial facilities and businesses to the east, north and south. In particular:

- Augen Waste Management Services, adjacent to the south-east of the Site;
- Riverside Road Bulk Liquid Storage and Jetties, adjacent and intersecting the eastern extent of the Site;
- Seal Sands Navigator Terminals, adjacent to the north-eastern extent of the Site;
- Teesside Biomass and Industrial Chemicals Limited, adjacent to the south of the Site;
- Teesside Gas Processing Plant, approximately 200m north of the Site; and
- Billingham Community Fire station, adjacent to the north-west of the Site.

2.1.7. The south-western extent of the site, Wilton Engineering Wharf (in Port Clarence, operated by Wilton Group), is within Haverton Hill industrial area, located to the west of the Site in the centre of the towns of Billingham, Stockton-on-Tees and the city of Middlesbrough. Approximately 1km to the east of Wilton Engineering Wharf is Clarence Wharf, also within the Site.

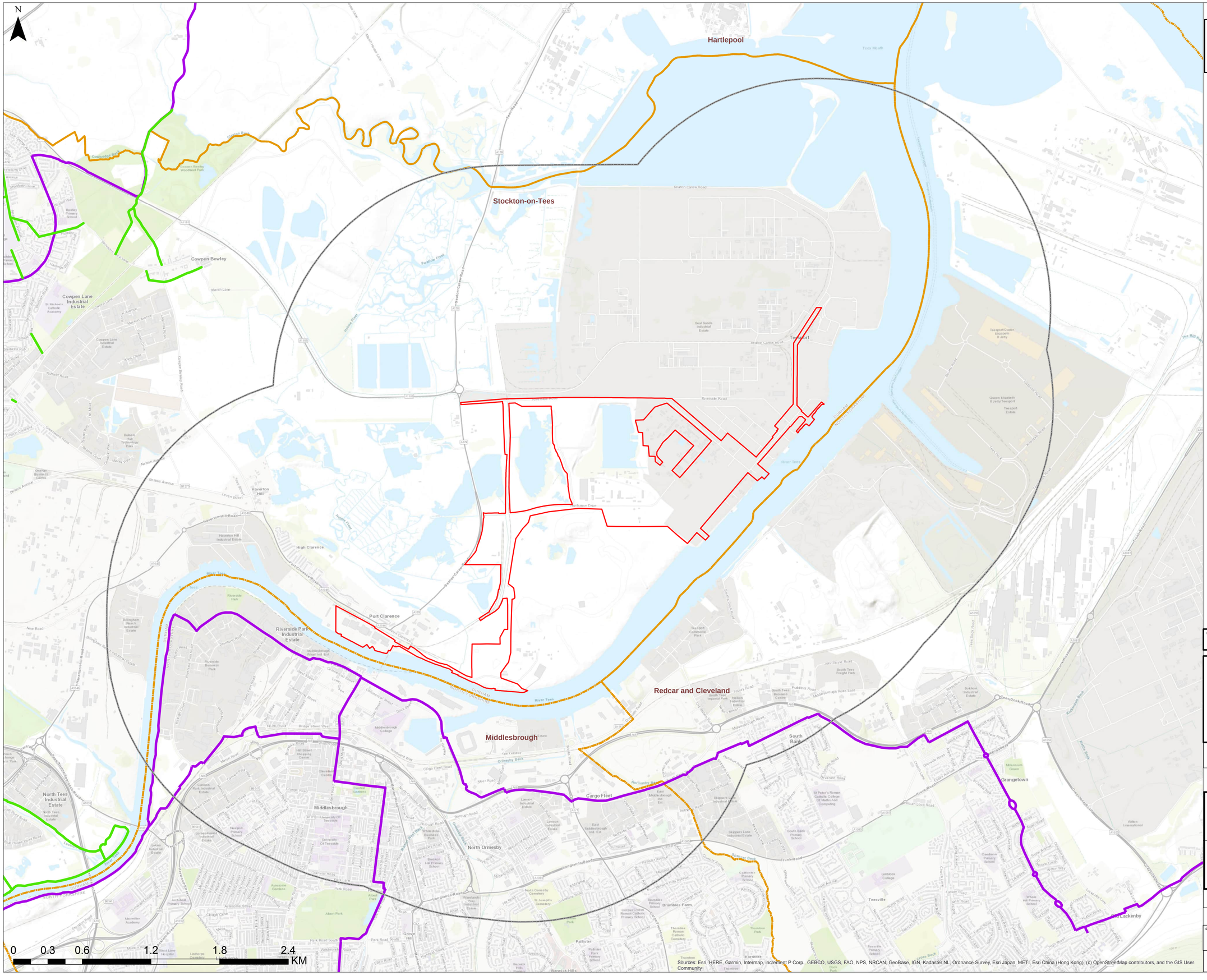
2.1.8. Immediately to the west of the site (and within 1km) are multiple water bodies and associated nature reserves:

- Dorman's Pool Nature Reserve;
- Saltholme East Pool Nature Reserve;
- RSPB Saltholme; and
- Paddy's Pool Nature Reserve.

2.1.9. These areas of surface water bodies extend further to the west and north-west of these nature reserves, providing a clear separation between the industrial landscape associated with the Site and Billingham further to the west. To the south of the Site is the River Tees, a major River, and the largest surface water body within the vicinity of the Site, that flows into the North Sea to the north-east of the Site. In addition, large portions of the south, west and east of the Site, and in particular the land surrounding the east and west of the Site, are within Flood Zone 2 and Flood Zone 3 areas. Further details on ecological sites and surface water bodies can be found in **Chapter 7: Terrestrial Ecology**, **Chapter 8: Marine and Freshwater Ecology** and **Chapter 9: Water Environment and Flood Risk**.

2.1.10. The nearest residential area to the Site is Port Clarence, located adjacent to the south-western point of the Site (Able Port Clarence facilities). The residential properties are concentrated within 400m of the River Tees along the A1046. Further south and west of the Site are the city of Middlesborough and the towns of Billingham and Stockton-on-Tees. Middlesbrough is separated from the southern extent of the Site by the River Tees, spanning approximately 250m. Some community facilities are present on the south bank of the River Tees within 300m of the Site, such as the Riverside Stadium, Middlesbrough College and the Middlesbrough Transporter Bridge. Further to the north of the Site (approximately 5km) is the town of Hartlepool. Further details on residential properties can be found in **Chapter 6: Noise and Vibration** and **Chapter 16: Population and Human Health**.

2.1.11. The road network adjacent to the Site includes the A1046, A1185 and Seaton Carew Road/A178 to the south-west (A1046) and west/north-west (A1185 and A178). These three roads connect the Site to Haverton Hill industrial area, Billingham and Hartlepool respectively. The west of the Site incorporates commercial railway lines, heading west into Haverton Hill and Stockton-on-Tees. Further details on the road network can be found in **Chapter 18: Traffic and Transport**.



DO NOT SCALE

Information Classification:

PUBLIC

Information that is available to the general public and is intended for distrubution outside WSP.

Key

- Proposed DCO Aplication Boundary
- 2 km Buffer
- Local Authority Boundary
- Public Rights of Way
- National Cycle Network

It should be noted that, at the date of production, only Stockton-on-Tees Borough Council data was available for Public Rights of Way.

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

APPLICANT: Lighthouse Green Fuels Ltd.

PROJECT: Lighthouse Green Fuels

TITLE: Figure 2.2a - Environmental Constraints Plan
Public Rights of Way and National Cycle Network

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PROJECT No:	**DESIGNED:** / **DRAWN:**	**DATE:**
70102442	AV / AV	18/07/2023

DRAWING No: 70102442-WSP-RP-ES-0202 REV: R-2

N

DO NOT SCALE

Information Classification:
PUBLIC
Information that is available to the general public and is intended for distrubution outside WSP.

Key

- Proposed DCO Aplication Boundary
- 2 km Buffer
- Main Rivers
- Flood Zone 3
- Flood Zone 2

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

APPLICANT: Lighthouse Green Fuels Ltd.

PROJECT: Lighthouse Green Fuels

TITLE: Figure 2.2b - Environmental Constraints Plan
Flood Zones and Main Rivers

SCALE @ A1:	CHECKED:		APPROVED:
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PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442	AV	AV	18/07/2023

DRAWING No: 70102442-WSP-RP-ES-0202 REV: R-2

0 0.3 0.6 1.2 1.8 2.4 KM

N

0 0.3 0.6 1.2 1.8 2.4 KM

DO NOT SCALE

Information Classification:

PUBLIC

Information that is available to the general public and is intended for distrubution outside WSP.

Key

- Proposed DCO Aplication Boundary
- 2 km Buffer
- Ramsar Sites
- Priority Habitat Inventory
- Local Nature Reserve
- Sites of Special Scientific Interest
- Special Protection Areas with Marine Components
- National Nature Reserve

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

APPLICANT: Lighthouse Green Fuels Ltd.

PROJECT: Lighthouse Green Fuels

TITLE: Figure 2.2c - Environmental Constraints Plan Ecologically Designated Sites at 2km Buffer

SCALE @ A1:	CHECKED:	APPROVED:
1:15000	AR	JK

PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442	AV	AV	18/07/2023

DRAWING No:	REV:
70102442-WSP-RP-ES-0202	R-2

N

0 1 2 4 6 8 KM

DO NOT SCALE

Information Classification:
PUBLIC
Information that is available to the general public and is intended for distrubution outside WSP.

Key

- Proposed DCO Aplication Boundary
- 10 km Buffer
- Ancient Woodland
- Ramsar Sites
- Priority Habitat Inventory
- Local Nature Reserve
- Sites of Special Scientific Interest
- Special Protection Areas with Marine Components
- National Nature Reserve

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

APPLICANT: Lighthouse Green Fuels Ltd.

PROJECT: Lighthouse Green Fuels

TITLE: Figure 2.2d - Environmental Constraints Plan Ecologically Designated Sites at 10km Buffer

SCALE @ A1:	CHECKED:	APPROVED:
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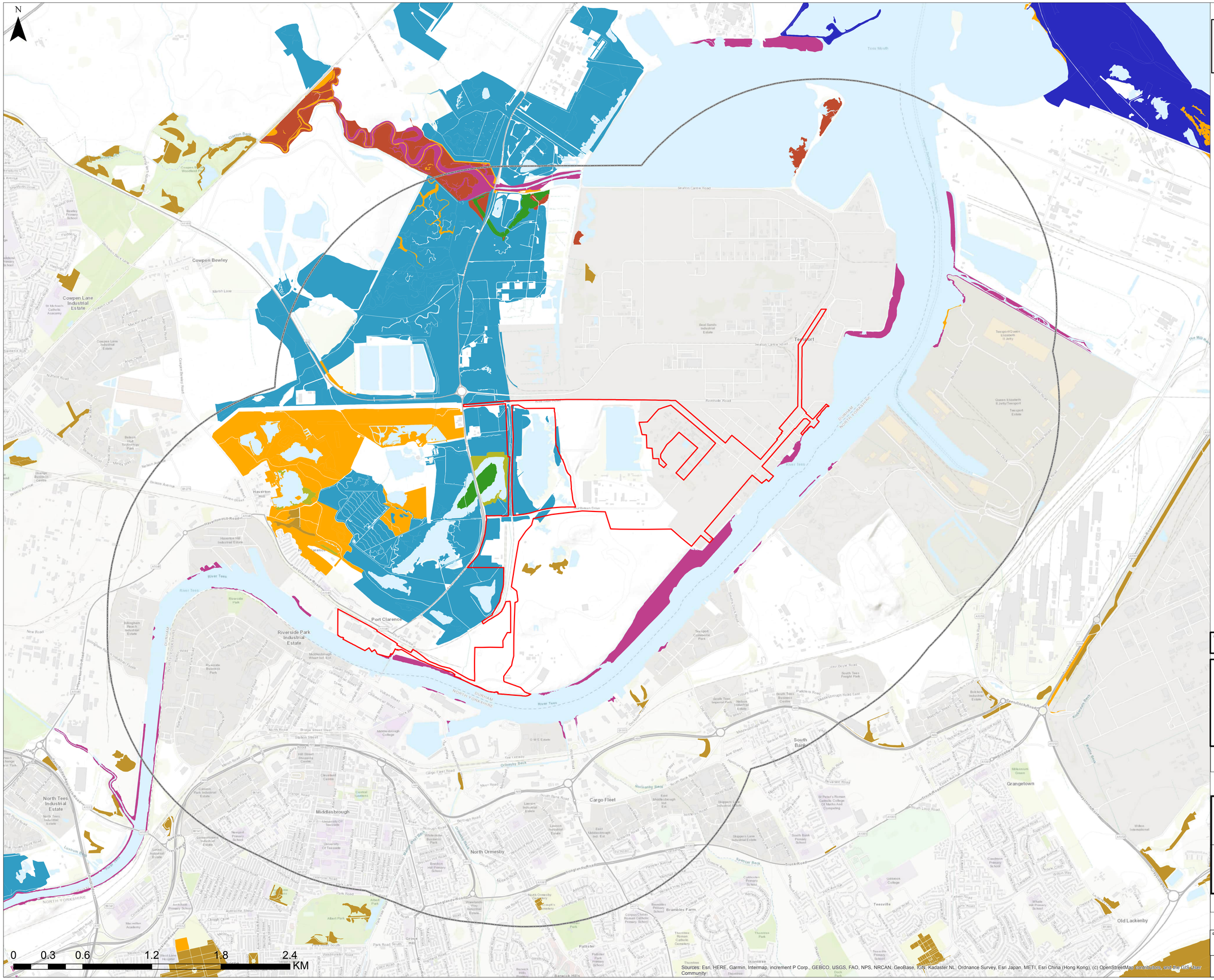
PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442	AV	AV	18/07/2023

DRAWING No: 70102442-WSP-RP-ES-0202 REV: R-2



DO NOT SCALE

Information Classification:
PUBLIC
Information that is available to the general public and is intended for distrubution outside WSP.

Key

- Proposed DCO Aplication Boundary
- 2 km Buffer

Priority Habitat - Sub Groups

- Coastal and floodplain grazing marsh
- Coastal saltmarsh
- Coastal sand dunes
- Deciduous woodland
- Lowland fens
- Mudflats
- No main habitat but additional habitats present
- Saline lagoons

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

APPLICANT: Lighthouse Green Fuels Ltd.

PROJECT: Lighthouse Green Fuels

TITLE: Figure 2.2e - Environmental Constraints Plan
Priority Habitat Inventory

SCALE @ A1:	CHECKED:	APPROVED:
1:15000	AR	JK

PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442	AV	AV	18/07/2023

DRAWING No: 70102442-WSP-RP-ES-0202

REV: R-2

DO NOT SCALE

Information Classification:
PUBLIC
Information that is available to the general public and is intended for distrubution outside WSP.

Key

- Proposed DCO Aplication Boundary
- 2 km Buffer
- Noise Important Areas Round 2 & 3
- Local Authority Boundary

Listed Buildings

- Grade II*
- Grade II

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

APPLICANT: Lighthouse Green Fuels Ltd.

PROJECT: Lighthouse Green Fuels

TITLE: Figure 2.2f - Environmental Constraints Plan Cultural Heritage and Noise Important Areas

SCALE @ A1:	CHECKED:	APPROVED:
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PROJECT No:	DESIGNED: / DRAWN:	DATE:
70102442	AV / AV	18/07/2023

DRAWING No: 70102442-WSP-RP-ES-0202 REV: R-2

0 0.3 0.6 1.2 1.8 2.4 KM

2.2. PROPOSED SCHEME DESCRIPTION

DESIGN

2.2.1. At this stage of the planning process the project description should be considered indicative to allow the appropriate design development to progress. In accordance with industry standard practices and PINS Advice Note 9 'the Rochdale Envelope' (**Ref 2.1**), a parameter-based 'design envelope' approach has been adopted in respect of the Proposed Scheme. The current status of the design is described within this chapter and detailed on **Figure 1-2** and **Figure 2-1**.

2.2.2. The indicative design envelope is intended to identify key parameters that are suitable to enable initial environmental appraisals to be carried out in a robust and proportionate manner. This will also enable the subsequent EIA to be based on a description of the location, design and size of the Proposed Scheme that is suitable to allow a comprehensive assessment of its likely significant environmental effects, whilst retaining sufficient flexibility to accommodate further refinement during detailed design. Further details of this approach are provided in **Chapter 3: Approach to EIA**.

2.2.3. At this stage a maximum envelope has been used, with maximum parameters provided where relevant. The assessments contained within this EIA Scoping Report therefore assesses a worst case scenario or presents options, including a worst case option. The design envelope will be refined as the Proposed Scheme continues to evolve through the key subsequent stages of the iterative design and EIA process, culminating in the Environmental Statement (ES) that will form part of the DCO application, alongside the associated Works Plans and Land Plans.

OVERVIEW OF THE PROPOSED SCHEME

2.2.4. The Proposed Scheme is expected to be the UK's first, commercial scale, waste-to-SAF project, converting SRF and/or waste biomass into aviation fuel for ongoing sale. The Proposed Scheme will utilise the Fischer-Tropsch (FT) process to create the SAF. This is a proven technology and is already in use around the world. Large-scale examples of the technology can be found in Nigeria (Escravos Project), Qatar (Pearl & Oryx Projects), and Uzbekistan (UzGTL Project).

2.2.5. The main components of the Proposed Scheme are as follows (see **Figure 1-2**):

- SAF Plant including the following but not exhaustively (see **Figure 2-1** with accompanying numbered identifiers):
  - Gasification Plant (1);

- Syngas Compression and Clean-up (2);
- FT Reactor (3);
- Product Upgrading Unit (4);
- Flare Area (5);
- Auxiliary Partial Oxidation Reactor (POx) (6);
- Air Separation Unit (20);
- Feedstock Silos & Treatment and Intermediate Feedstock Storage (21 & 22);
- General Administration Facilities (23); and
- Process Waste Storage (24).
- Carbon Capture Unit (7);
- Thermal Oxidiser (8);
- Utilities (9&10);
- Wastewater Treatment Plant (11);
- Surface Water Pond (12);
- Miscellaneous Tankage (13);
- CCGT Power Plant (14);
- Sub-Stations & ancillary equipment (15-17);
- Maintenance & Laydown areas (TAR 1 & 2) (18 & 19);

- Feedstock Processing and Storage Area;
- Bulk Liquid Storage (for SAF and naphtha);
- Pipeline and cable connections (import and export) and Utility Corridors;
- Flares;
- Internal Heavy Haul Road (for construction phase only);
- Internal Conveying Corridors;
- Rail Terminal; and
- Marine Transport Infrastructure (for construction and operational usage).

2.2.6. A range of other associated development including administration buildings, kiosks and accommodation and welfare facilities, boundary treatments, security infrastructure, temporary and permanent laydown areas, hard and soft landscaping, drainage, cables, pipelines, plant and equipment will also be required. These are included within the stated design envelope and will be assessed as part of the Proposed Scheme's EIA.

Layout and Orientation

2.2.7. The Proposed Scheme will be subject to ongoing design development. One orientation for the SAF Plant is currently proposed subject to further modelling and design refinement. This is shown in **Figure 2-1**.

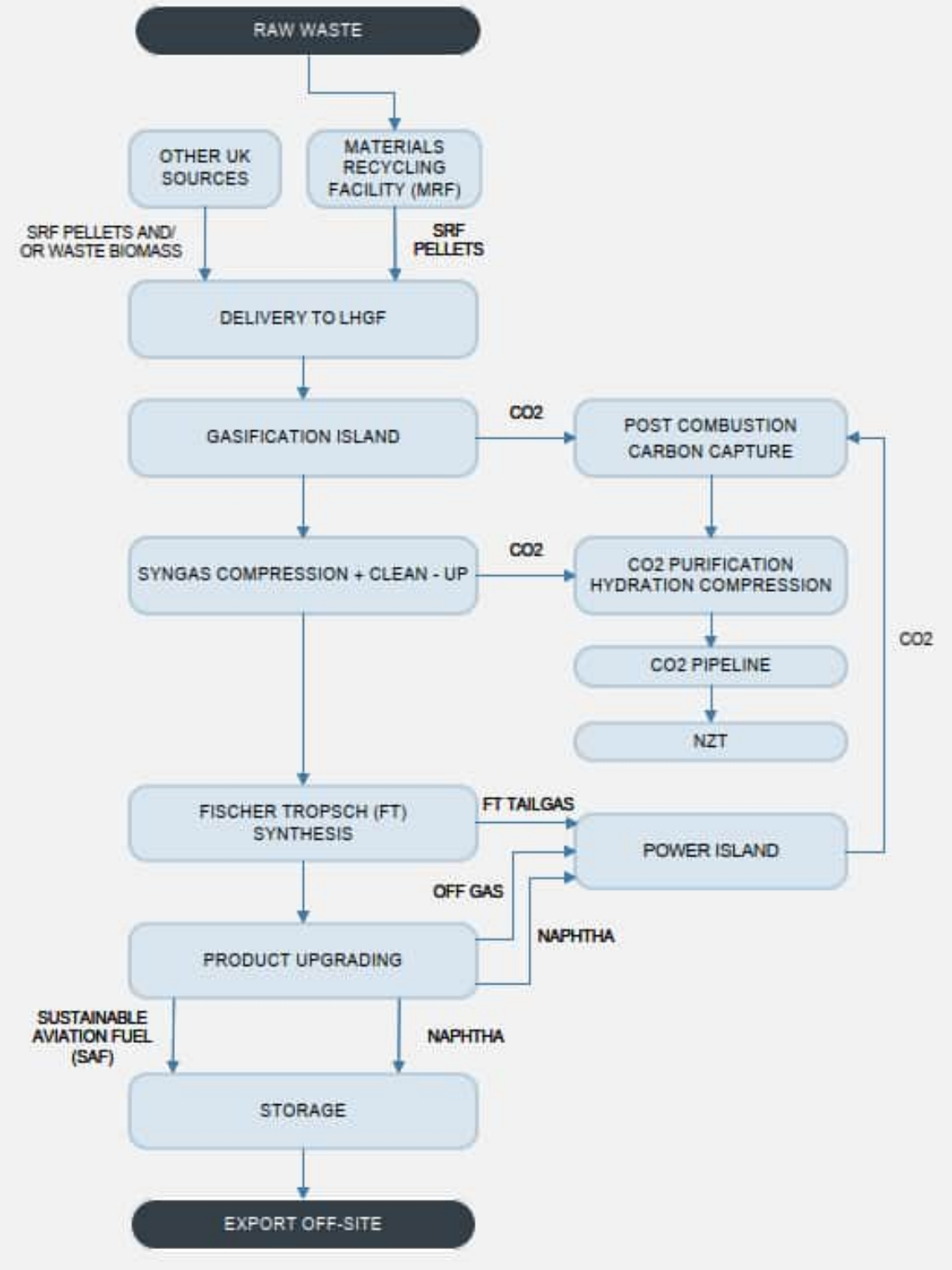
2.2.8. Some ancillary buildings may also be required subject to further refinement during the Front End Engineering Design (FEED) process which is expected to be completed prior to the grant of the DCO. Any required flexibility will be within the design envelope and assessed as required within the ES at submission. This also means that any flares, vents and stacks associated with the SAF Plant will be subject to micro-siting within the parameters of the proposed orientation.

2.2.9. Potential areas for biodiversity net gain (BNG) and mitigation will be identified and the requirement for and extent will be confirmed as part of the EIA process and reported in the DCO submission.

Description of the SAF Production Process

2.2.10. This section provides an overview of the SAF production process which is also depicted in **Figure 2-3** below.

Figure 2-3 - SAF Process



2.2.11. Raw input waste material is delivered to the neighbouring, existing and operational Materials Recycling Facility (MRF). The MRF will process the raw waste feedstock, producing a homogeneous pelletized solid recovered fuel (SRF) feedstock for the LGF facility. This process also removes any recyclable

materials for further processing. SRF feedstock is then transferred to Waste Feedstock Storage Silos (via intermediate storage), providing storage capacity for the SAF production process.

2.2.12. Additional waste feedstock, in the form of SRF pellets and/or waste biomass, will be sourced nationally from other MRFs across the UK and transferred by rail to the Navigator North Tees Rail Terminal and / or by road to intermediate storage areas. The feedstock is then transferred to the intermediate storage via conveying equipment to be installed between the rail terminal and the main SAF Plant, and then to the Waste Feedstock Storage Silos.

2.2.13. Feedstock is transferred from the Waste Feedstock Storage Silos to the Gasification Facility where it is converted into syngas. By-products, such as particulate matter, ammonia and sulphur species are removed from the raw syngas in the raw syngas clean-up units, which include high temperature tar cracking and wet scrubbing steps. The partially cleaned syngas is compressed to high pressure and directed to the Syngas Clean-Up and Compression Unit.

2.2.14. Within the Syngas Clean-Up and Compression section are several adsorbent and catalytic processes designed to remove residual contaminants from the syngas and adjust the ratio of hydrogen to carbon monoxide, generating an ultra-pure gas for conversion to liquid products in the FT Reactor. An acid gas removal unit (AGRU) then removes acid gases to increase the hydrogen content in the syngas. The treated syngas from the AGRU will be treated in a thermal oxidiser followed by caustic scrubbing. The resultant by-product of CO_2 produced from the AGRU is then recycled back to the gasifier islands to be used for future purges as well as being purified and compressed before exporting to the CO_2 pipeline and capture units (see below). A pressure swing absorber (PSA) unit will also be installed to recover high purity hydrogen from the syngas. Hydrogen is required for the FT Reactor, product upgrading unit and AGRU.

2.2.15. Ultra-clean syngas is converted into long-chain hydrocarbon waxes and other light hydrocarbon species in the FT Reactor. Light hydrocarbons are recycled and used to produce power in the integrated Combined Cycle Gas Turbine (CCGT) power plant. Hydrocarbon waxes are upgraded in an on-site hydrocracker, producing a mixed hydrocarbon stream. Conventional fractionation technology is used to separate the desired final synthetic paraffinic kerosene (SPK, known also as SAF) product and by-product Green Naphtha. Off-gases from the product upgrading units and FT Tail gases are recycled and used in the integrated CCGT power plant for power generation. Naphtha can also be utilised in the power plant if required.

2.2.16. SAF and Green Naptha will be sent to a small buffer storage on site where it will be tested and quality checked before being transferred to off-site bulk liquid storage via two separate pipelines (see **Figure 1-2**). Existing bulk storage within

the adjacent tank farm, operated by a third party, will also be provided. Pipeline infrastructure for the SAF and Green Naphtha will also be installed between the bulk liquid storage terminal and the rail terminal. The Proposed Scheme therefore will incorporate export facilities via both rail and marine infrastructure.

2.2.17. Gaseous CO_2 from the Gasification Island and CCGT flue gas can be sent to the Post Combustion Carbon Capture Unit. This is purified/dehydrated (as also is the CO_2 from the AGRU (as described above)), compressed and directed to permanent storage via the CO_2 pipeline being developed as part of the Net Zero Teesside (NZT) project1. This enables the reduction of greenhouse gas (GHG) emissions from the Proposed Scheme and helps reduce the carbon intensity of the final SAF product. It is preferred that NZT will be operational and connected to the Proposed Scheme from the beginning of the operation phase of the Proposed Scheme. However, as this is not a certainty, and the Proposed Scheme is not dependent on the operational NZT project, an alternative scenario of a delay of up to 5 years from Proposed Scheme's operation phase to the operational connection to NZT is assumed as a worst case. This is to account for delays on the NZT project and works to facilitate connectivity with the Proposed Scheme.

ELEMENTS OF THE PROPOSED SCHEME

2.2.18. The following sections provide further detail on the components which make up the Proposed Scheme. Where relevant, indicative design / physical parameters have been provided which comprise the proposed design envelope and form the basis of the technical assessments scoped into the EIA.

SAF Plant

2.2.19. **Table 2-1** outlines the principal components of the SAF Plant (which can be seen in **Figure 2-1**) with numbered elements corresponding to the components below.

2.2.20. The SAF facility will be regulated by an environmental permit. Air and water emissions will be subject to strict emission limit values (ELVs). The SAF production process results in a number of emissions to air but where required (in order to meet ELVs) they are subject to required abatements. Air quality modelling (including determination of dimensions of key elements of the SAF Plant, such as stack heights) will be undertaken to minimise impact on ecological receptors (for further details see **Chapter 5: Air Quality**, **Chapter 7: Terrestrial Ecology** and **Chapter 8: Marine and Freshwater Ecology**.

[1] https://www.netzeroteesside.co.uk/

Table 2-1 - Components of the SAF Plant

Figure 2-1 Identifier	Component	Description	Indicative Parameters W (m) x L (m) x H (m)	Plus "Associated Equipment (AE)" (m) e.g. Columns/Stacks
1	Gasification Plant	Up to four "gasifier trains" which gasify the feedstock into a synthesis gas (syngas).	Approximately 210 x 90 x 55	Up to 4 Stacks - each approximately 60m in height
2	Syngas Compression and Clean-up	Syngas from each of the gasifier trains is combined, compressed and then purified in the secondary gas clean-up unit to reduce the contaminants to suitable levels to avoid damaging the FT catalyst. The CO_2 is then recycled back to the Gasification Plant (1) as well as being exported to the Carbon Capture Unit (7).	Approximately 150 x 130 x 25	Assumed heights of columns in AGRU: ▪ Re-absorber: approximately 75m; ▪ Hot Regenerator: approximately 60m; ▪ CO_2 Absorber: approximately 52m; ▪ Flash Column: approximately 40m; ▪ Methanol Water Column: approximately 35m; ▪ H_2S absorber: approximately 30m.
3	FT Reactor	One Reactor and ancillary equipment shall be installed and fed by the purified syngas. The resulting ultra-clean syngas is then catalytically converted in the Reactor into long chain hydrocarbon waxes and other light hydrocarbon products.	Approximately 145 x 77 x 20	▪ FT Reactor approximately 70m in height; ▪ Cat. Hopper approximately 55m in height; and ▪ Water fractionator approximately 35m in height.

Figure 2-1 Identifier	Component	Description	Indicative Parameters W (m) x L (m) x H (m)	Plus "Associated Equipment (AE)" (m) e.g. Columns/Stacks
4	Product Upgrading Unit	The products from the FT Reactor are processed in the Product Upgrading Unit (PUU) to produce synthetic paraffinic kerosene (SPK) and naphtha.	Approximately 145 x 77 x 25	Fractionator vessel up to 40m in height.
5	Flare Area	Three flare systems (high pressure (HP) and low-pressure (LP & LLP)) for emergency / abnormal operational scenarios.	The maximum height of a flare stack is anticipated to be 130m above ground level (agl) (subject to dispersion modelling) within a 60m radius sterile area. There are 3 flare systems (HP, LP & LLP). Associated with these flare systems are 2 flare stacks, a HP/LP flare stack (up to 130 m in height) and an LLP flare stack (approximately 46m in height).	
6	Auxiliary POx	An Auxiliary POx will assist in shortening the plant start-up schedule, as well as supplementing lost syngas in the event of waste gasification outage during normal operation.	Approximately 40 x 40 x 45	1 stack: up to 30m in height

Figure 2-1 Identifier	Component	Description	Indicative Parameters W (m) x L (m) x H (m)	Plus "Associated Equipment (AE)" (m) e.g. Columns/Stacks
7	Carbon Capture Unit	CO_2 from the Pulse Combustor Heaters (Gasification Plant) and CCGT flue gas will be sent to the Post Combustion Carbon Capture Unit. The CO_2 is purified/dehydrated, compressed and directed to permanent storage via the CO_2 pipeline being developed as part of the NZT project.	Approximately 110 x 130 x 12	▪ DCC: up to 40 m in height; ▪ Absorber: up to 71.5 m in height; ▪ Stripper: up to 55 m in height; and ▪ Stack at Top of Absorber: up to 105 m in height
8	Thermal Oxidiser	Treated syngas from the AGRU (2) is further treated in a Thermal Oxidiser followed by caustic scrubbing.	Approximately 30 x 20 x 8	Caustic Scrubber stack 30 m in height
9 & 10	Utilities	Separated into two components: ▪ Utilities 1 - Plant/Instrument Air, Fire Water systems and storage, Raw water treatment, Potable Water treatment, Demin Water treatment and Condensate recovery; and ▪ Utilities 2 - Cooling water (CW) system.	Approximately 150 x 95 x 10	There may be some vessels / tanks up to 15 m in height.
11	Wastewater Treatment Plant	All wastewater streams produced by the facility are treated in the wastewater treatment plant (WWTP) in order to maximise re-use and minimise water usage and minimise waste water discharge / enable compliance with discharge limits. The effluent will be discharged to Northumbrian Water's Bran Sands wastewater treatment (WWT) facility.	Approximately 80 x 80 x 10	

Figure 2-1 Identifier	Component	Description	Indicative Parameters W (m) x L (m) x H (m)	Plus "Associated Equipment (AE)" (m) e.g. Columns/Stacks
12	Surface Water Pond	Collects surface water run-off which can be tested prior to discharge. This determines if run-off needs to pass through WWTP first before discharge.	Approximately 70 x 65 x 3* *Assumes that there may be walls/some above ground storage due to high water table.	
13	Miscellaneous Tankage	Intermediate wax and buffer storage facility for SAF/naphtha (including metering and transfer equipment).	130 x 85 x 14	
14	CCGT Powerplant	The power plant will comprise of the following: Gas Turbine (GT) generators with Heat recovery steam generators (HRSG), Auxiliary boiler, Steam turbines and all associated utility systems. The internal power demand will be based on supplying the SAF production facility as well as power export to the grid for any excess supply not used internally by the SAF process. It shall also provide a balance of steam requirements to the main SAF production facility.	Indicative electrical output of 150MW exported at point of grid connection. Approximately 90 x 175 x 15	3 stacks: approximately 40m in height (2x GT/HRSG exhaust and 1 Auxiliary boiler).
15-17	Sub-Stations & ancillary equipment	Three Sub-Stations with supporting equipment.	Approximately 80 x 34 x 10	

Figure 2-1 Identifier	Component	Description	Indicative Parameters W (m) x L (m) x H (m)	Plus "Associated Equipment (AE)" (m) e.g. Columns/Stacks
18 & 19	Maintenance & Laydown areas (TAR 1 & 2)	Designated areas for receipt, temporary storage and assembly of construction equipment, components and materials.	TAR 1: Approximately 80 x 60 TAR 2: Approximately 108 x 75	
20	Air Separation Unit	An air separation unit (ASU) to facilitate the production of oxygen and nitrogen required by the SAF Plant.	Approximately 12 x 120 x 15	Cold Box: approximately 45m in height Cooling Tower: approximately 28m in height
21 & 22	Feedstock Silos & Treatment and Intermediate Feedstock Storage	See descriptions below (Paragraphs 2.2.21-2.2.23).	Feedstock Silos: Approximately 100 x 30 x 15 Intermediate Feedstock Storage (two options presented): 206 x 88 x (see option).	Feedstock Silos: 4 Silos approximately 45m in height Intermediate Feedstock Storage (two options): ■ 1 for Silos – 4 silo structures (10 Silos per block) – approximately 35 m in height; and ■ 2 for Bays – 10 Bays per building – 4 Buildings, approximately 12 m in height.
23	General Administration Facilities	Offices, welfare, control room, stores, maintenance building, laboratories, garages, parking and security.	Approximately 280 x 230 x 0 (Generally at ground level but with structures up to 12m in height).	

Figure 2-1 Identifier	Component	Description	Indicative Parameters W (m) x L (m) x H (m)	Plus "Associated Equipment (AE)" (m) e.g. Columns/Stacks
24	Process Waste Storage	Waste storage area for Ash/Slag/Tramp (inorganic components that are larger than fine ash, including materials such as metals, glass, rocks and ceramics)		

Feedstock Processing and Storage Area

2.2.21. Raw input waste material will be delivered to the adjacent, existing and operational MRF currently operated by N + P group where it will be used to produce the SRF, and then moved to the Site via conveying equipment (as will the additional SRF and/or waste biomass as sourced from other MRFs as described above).

2.2.22. Up to four Waste Feedstock Storage Silos will be required within the Site for the storage of waste feedstock which is delivered to the gasifiers. Each will provide up to 5 days of operational storage and each silo will be up to 45m high (agl).

2.2.23. It is anticipated that a secondary facility (a bulk solid material feedstock storage area (intermediate storage) will be constructed adjacent to the SAF Plant Site. This secondary facility will be operated by LGF and provide buffer storage to accommodate operational regime differences between the Site and associated MRF facilities. The storage facility will allow the LGF plant to build up suitable buffer capacity to maintain operations while the MRF(s) supplying the feedstock are shut down for maintenance, and vice versa. The storage will be provided by bunkers. These bunkers will be constructed within a dedicated building.

Bulk Liquid Storage (SAF/NAPTHA)

2.2.24. It is anticipated that by-products from the SAF process and the final products (SAF and naphtha) will be stored in large scale bulk liquid storage tanks on the neighbouring tank farm to the east of the Site. From this existing tank farm, products will be transferred to the off-site storage facility via pipelines. This area is shown on **Figure 2-2**.

2.2.25. A smaller, buffer storage area is proposed within the Site (see Identifier 13 in **Table 2-1**).

Internal Utility Corridors

2.2.26. The Proposed Scheme will require new utilities and connections to be installed as well as the potential reuse of existing facilities if practicable. These will likely run parallel to internal roads and between components of the Site either above ground or buried.

2.2.27. Owing to the nature of the transported pipeline contents, all internal pipelines will have the required protection measures in accordance with legal requirements. Pipelines are likely to be required for the following non-exhaustive purposes:

- Combined heat and power (CHP) connections to the existing adjacent MRF providing low-grade heat for drying the waste feedstock and for the returned heating fluid post use;
- Transporting gaseous oxygen and nitrogen from the new ASU to the SAF plant;

- The transfer final products (SAF and Green Naphtha) to and from the existing tank farm and new onsite buffer storage to existing waterside bulk liquid storage terminal;
- The transfer final products (SAF and Green Naphtha) to and from the existing tank farm and new onsite buffer storage to existing inland rail / freight terminal;
- CO_2 pipeline and connection point required to connect the Proposed Scheme into the NZT carbon capture and storage infrastructure;
- Other ancillary pipelines for internal use; and
- General utilities e.g. new Natural Gas pipeline; raw/potable water and waste-water.

2.2.28. Cables are likely to be buried or supported off existing structures for the following non-exhaustive uses:

- Electrical cables between the Proposal Scheme and neighbouring MRF facility to provide power (generated by the Project's Integral CCGT Power Plant);
- Electrical cables between the CCGT and SAF Plant;
- Electrical cables between the CCGT and onsite substation; and
- Other ancillary electrical cables for internal power use.

Flares

2.2.29. Multiple flares will be required for service specific relief loads as part of the Proposed Scheme, however the vapour from these will tie into the main LP/HP flare systems (pressure flares for emergency/abnormal activities). Two flare stacks are required for emergency and abnormal activities (LP/HP & LLP), and the Proposed Scheme will require one flare stack up to 130m agl, although the final height will be confirmed taking into consideration dispersion modelling undertaken as part of the EIA.

Internal Heavy Haul Road Access

2.2.30. The Proposed Scheme intends to use an internal heavy haul road utilising existing private road infrastructure during construction of the Proposed Scheme to transport construction components and equipment from chosen marine landing facilities to the Site. It is assumed that construction works will be required to enable the internal heavy haul road to be suitable for use in the construction phase. Details on the exact location and nature of these works are yet to be determined. Further detail on the potential marine facilities and construction routes is outlined in Paragraphs 2.2.35-2.2.40 and **Table 2-2**.

Internal Conveying Corridors

2.2.31. Multiple internal conveying equipment may be required for the internal transportation and connection of the Feedstock Processing and Storage Area to the SAF Plant (including transportation of feedstock). Conveying equipment is also likely to be

installed to connect the SAF Plant to the existing rail terminal in the southwest of the Site.

2.2.32. These are likely to be above ground and covered where appropriate to protect transported materials from weather and external elements.

Rail Terminal

2.2.33. The Applicant proposes to utilise an existing rail terminal operated by Navigator located southwest of the Site for the transportation of feedstock to the Site and also transportation out of final products. This existing terminal is currently utilised by Navigator for the export of bulk liquids. The Applicant is currently liaising with Navigator in relation to protective provisions and likely works required.

2.2.34. In order to facilitate the Proposed Scheme, the following new infrastructure will be required:

- Feedstock handling and buffer storage facilities;
- Associated utilities and connecting conveying equipment; and
- An additional rail track and associated facilities.

Marine Transport Infrastructure

2.2.35. The Proposed Scheme intends to utilise existing marine infrastructure for the construction and decommissioning phases (transportation of equipment and modular units) and during operation, for the transportation of final products (SAF and naphtha).

2.2.36. The Applicant is currently undertaking logistics studies to determine the feasibility of several options, and the conclusion of this, in addition to liaison with third party operators and statutory and non-statutory consultees on the suitability and use of these facilities will be further explained and assessed in the PEIR and ES as appropriate.

2.2.37. For the construction phase, the following options are as described below in **Table 2-2**.

Table 2-2 - Construction Phase Marine Transport Infrastructure Options

Option	Description and Route	Works Required to Facilitate Use
1 – Wilton Engineering Wharf	This existing wharf operated by Wilton Engineering (see **Figure 1-2**) would be utilised for the delivery of modular units and equipment, which is then transported east to the Site via a short section of public highway past the transporter bridge entrance and a small number of residential properties. This would continue east and connect to a long section of an existing private road which is understood to be used	Limited works would be required to the existing wharf, predominantly to facilitate the movement of large modular units such as removal of ancillary buildings, localised vegetation clearance and temporary movement of street furniture. The existing private road may require turning areas and condition

Option	Description and Route	Works Required to Facilitate Use
	as an emergency services route. Before turning north towards the Site, the road crosses an area of scrub land currently being used as an unofficial motocross area.	management to take heavy loads and provide passing places for emergency purposes. This is currently being investigated and will be confirmed in the ES. If required, localised vegetation removal may be required where present. No works in the marine environment or dredging is anticipated to be required.
2 – Clarence Wharf	To the east of the Wilton wharf (see **Figure 1-2**), this existing wharf is currently being investigated in terms of its recent operational usage and structural integrity. Depending on these investigations and operator and consultee discussions, the Applicant could reinforce the wharf to allow heavy loads to be delivered or locate a lift on/lift off barge adjacent to the wharf to facilitate transport thereby only using the wharf for mooring. This option would involve a connection to the existing private internal heavy haul road which connects north to the Site.	Depending upon investigations, some reinforcement directly to the existing wharf may be required to facilitate the heavy loads. Therefore, some interaction with the marine environment may be required for additional piles or top slab reinforcement. A moored lift on/lift off vessel would only require mooring and no reinforcement to the wharf. However, the wharf may require reinforcement to land the modules on (subject to survey). Localised vegetation clearance would be required for the internal heavy haul road turning areas and condition management where necessary.

2.2.38. These options are currently being explored and the preferred option(s) will be confirmed within the PEIR and ES and assessed as appropriate (including within an HRA if required). Consultation with Natural England (NE), Environment Agency and the Marine Management Organisation (MMO) will be undertaken ahead of the PEIR and the results reported.

2.2.39. During the operation phase, two existing jetties off Riverside Road will be utilised for transporting the operational product off-site via barges (see **Figure 1-2**). These existing and operational wharfs are operated by Navigator Seal Sands Bulk Liquid Storage Terminal and no physical works to these facilities are anticipated. At this time, details on the types, number and routes of the barges used to transport the operational product are not known.

2.2.40. For the decommissioning phase, it is assumed that the existing wharf facilities will be available at the end of the Proposed Scheme's operational lifespan for use in other commercial operations.

ALTERNATIVE TECHNOLOGIES CONSIDERED

2.2.41. The Proposed Scheme has been designed to use a Gasification + FT technology that converts waste feedstocks into liquid fuels, namely SAF and Naphtha.

2.2.42. Alternatives for SAF production (from waste feedstock) are available which still use gasification but different conversion and refinement processes. Upon review of these alternatives, the Applicant considered that the use of gasification and FT technology offered the greatest benefits (see Paragraphs 2.2.44-2.2.46).

2.2.43. In addition, there are also alternative fuel products which can be produced from waste feedstocks such as methanol, bio-synthetic natural gas and green H2. Upon review of these alternative fuel products, SAF was considered to be the most viable given the established technology.

Reasoning for the use of Gasification + FT technology

2.2.44. Gasification + FT routes to produce SAF have been shown to offer the lowest carbon intensity SAF compared to other routes for producing SAF (such as Hydrotreated Esters and Fatty Acids (HEFA)), in particular when considering waste feedstocks. This has been shown in several high-profile studies (**Ref 2.2** and **Ref 2.3**). Combined with CCS, Gasification + FT routes can offer appreciable negative emissions.

2.2.45. In addition, a commercial-scale reference project (Sierra Biofuels plant, Nevada USA. Developed by Fulcrum Bioenergy[2]) is being deployed in the United States demonstrating the technologies using waste as a feedstock. Based on this project, the Applicant is of the view that the Gasification + FT route offers the highest Technology Readiness Level (TRL)

2.2.46. Alternatives such as Alcohol-to-Jet (AtJ) routes are expected to require higher plant capital expenditure (CAPEX) (because of more processing steps) and ultimately result in higher SAF costs.

Reasoning for the use of a CCGT plant for the Proposed Scheme's energy generation

2.2.47. The selected CCGT option offers significantly higher overall efficiency compared to a combustion and steam cycle option.

2.2.48. The CCGT will feature downstream heat recovery steam generators (HRSGs) to maximise heat recovery from the hot gas turbine exhausts. This heat will be used to raise high-pressure (HP) steam for use in a steam turbine. The CCGT efficiency is expected to be ~60%, whereas for pure steam cycle configurations this is expected to not be more than ~35%.

[2] https://www.fulcrum-bioenergy.com/sierra-biofuels

2.2.49. The CCGT power plant will be coupled with carbon capture technology to remove CO_2 from the flue gas streams exiting the HRSGs. The CO_2 will be sent for permanent sequestration in the NZT / Northern Endurance Partnership CCS infrastructure as shown in **Figure 2-3**.

2.3. CONSTRUCTION PHASE

INDICATIVE CONSTRUCTION PROGRAMME

2.3.1. The construction phase is likely to be up to four year's duration, commencing promptly on the determination of the DCO and discharge of relevant pre-commencement Requirements.

2.3.2. At present, some Site preparation works are being undertaken to enable the construction phase, including demolition. These works are anticipated to last from April 2023 to April 2024. These are not being consented under the DCO but will be taken account of if required within the cumulative assessment. The works listed from this point are those included as part of the Proposed Scheme DCO.

CONSTRUCTION METHODOLOGY

Enabling Works & Ground Preparation

2.3.3. Initial enabling works would be undertaken to prepare the Site for the Proposed Scheme. This would include any remaining site clearance (including vegetation clearance), ground works including demolition of any remaining existing above ground structures, remediation works (if required) and excavation of any voids or underground services.

2.3.4. Any waste material will be sorted with concrete being crushed and compacted to be reused as backfill material, should geotechnical and geo-environmental testing deem the material suitable.

2.3.5. The former and existing evaporation pond located on the Site will be excavated and backfilled. The pond currently contains no water and therefore no pumping is required.

2.3.6. Piling will be required within the Site to create foundations for the main structures and this is expected to be undertaken using various methods depending on the type of pile to be installed. This could include percussive, continual flight auger (CFA) and / or vibropiles. Should any piling be required in the marine environment depending on the marine infrastructure option, this will be confirmed at a later date, after consultation with the EA and depending on whether jetty improvement works are required.

2.3.7. A geotextile will be installed at the appropriate depth below ground level during the compaction works to protect the water table, and avoid any piling material from reaching groundwater.

Construction Vehicles

2.3.8. Construction vehicles will be required on-Site and these are likely to include excavators, transportation vehicles such as Moxy earth moving equipment, piling rigs and cranes.

2.3.9. Most vehicles will be delivered to the Site at the start of the construction phase. Specialist equipment, such as piling rigs and cranes, will arrive at times of key activities taking place within the four-year construction phase.

2.3.10. Once delivered on-Site and utilising the internal roads, there is no requirement for these vehicles to be on the public highway.

Waste Materials

2.3.11. If required, the Site contains sufficient area to enable remediation and storage of construction wastes for the duration of the construction phase.

2.3.12. Any unsuitable or contaminated construction materials may be exported via the public highway network.

2.3.13. Biomass from site clearance will be collated and mulched accordingly to be reused in site enhancement and reinstatement works where possible.

Crane Arcs and High Structures

2.3.14. The maximum height of cranes utilised during the construction phase is anticipated to be 135m (15m above the tallest structure). As per Civil Aviation Authority guidance3, aviation lighting will be installed where necessary.

TEMPORARY CONSTRUCTION COMPOUNDS

2.3.15. Construction laydown areas will be located within the Site at key locations in order to facilitate safe construction activities especially those on critical path schedule such as delivery of large modular equipment. The location of these will be confirmed within the Works Areas and assessed in the ES at submission. Proposed locations are presented on the Site Layout Plan (**Figure 1-2**).

CONSTRUCTION WORKER NUMBERS AND SITE

2.3.16. It is anticipated that up to 750 temporary construction staff will be required at peak during the construction phase.

2.3.17. A temporary construction worker site may be required for a proportion of the above number of workers, and this will be located offsite. There is the potential for a smaller number of workers to remain onsite in temporary sleeping accommodation during critical path activities such as concrete pours. These small number of onsite accommodations will be located within the construction laydown areas, with

[3] CAP1096: https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=5705

appropriate welfare facilities installed to support these activities. There are no current proposals to require onsite worker accommodation for the full duration of construction with the exception of security. A worker accommodation strategy will be included with the DCO application.

2.3.18. A location for the worker site has not yet been identified. This will be further appraised in the PEIR.

CONSTRUCTION WORKING HOURS

2.3.19. For critical path activities, working over weekends and for 24 hours (such as for concrete pours) may be required. In these cases, it is anticipated that such hours would accord with the local authority's standard weekend / bank holiday hour requirements.

CONSTRUCTION DELIVERY AND ACCESS

Construction Routes

Marine Deliveries

2.3.20. Larger modules and equipment will be delivered to site via the River Tees to the chosen marine infrastructure location. It is expected that up to up to 200 deliveries of construction materials will be required via this route over an 18 month period within the four year construction phase.

2.3.21. Abnormal load vehicles (self-propelled modular transporters (SPMTs)) will be needed to facilitate movement of the plant from the wharf location to the required location for installation in the Proposed Scheme, at specific stages within the programme. Option 1 of the marine infrastructure options would require access initially onto a short section of public highway (Port Clarence Road north of the Middlesbrough Transporter Bridge) before transitioning onto the internal heavy haul road (see **Figure 1-2**). Option 2 would only require the abnormal loads to be driven to the SAF Plant Site utilising the internal heavy haul road.

2.3.22. Smaller equipment and materials will be delivered directly to the Site via the highway network. Two routes are currently being considered – one from the north and a second from the south (the A1185 and the A1046 respectively). It is not anticipated that these construction routes will require any improvements but this will be confirmed within the PEIR and ES once the results of the logistics study and any relevant swept path analysis has been completed.

2.3.23. Construction worker traffic is likely to follow the same routes as construction traffic for materials detailed above, linked to the location of the construction worker site.

2.3.24. An outline Construction Traffic Management Plan will be prepared and submitted with the ES.

CODE OF CONSTRUCTION PRACTICE

2.3.25. An outline Code of Construction Practice will be prepared and submitted as part of the EIA.

2.4. OPERATION PHASE AND MAINTENANCE

PROJECT LIFESPAN

2.4.1. The operational lifespan of the project is estimated to be 30 years.

HOURS OF WORKING

2.4.2. Working hours are estimated to be 24 hours per day once operational working conditions are initiated for the duration of the lifespan. This would be concentrated within the SAF Plant in the centre of the Site.

MAINTENANCE

2.4.3. Maintenance of the Proposed Scheme would involve routine, planned maintenance and system checks, as well as reactive maintenance and repairs. It is anticipated that the former scenario would be every few years in frequency.

PERMANENT STAFF

2.4.4. Once operational, the Proposed Scheme will employ approximately 115 direct full time employees (FTE) at the SAF Plant, approximately 120 FTEs at other facilities forming part of the Proposed Scheme (plus an additional 40 at a MRF elsewhere in the UK) and approximately 600 FTEs from indirect jobs at other locations in the UK.

OFFSITE FACILITIES

2.4.5. Once the construction phase is completed and the Proposed Scheme operational, the temporary worker site will be converted into permanent off-site parking facilities for full-time employees and contractors of the Proposed Scheme during maintenance. This is in accordance with typical bio-refinery norms. Any space not required by operational parking will be reinstated.

OPERATIONAL PERMITTING

2.4.6. The Applicant is currently proposing to consolidate the two existing Environmental Permits (namely related to the previous Air Products Ltd activities) and vary the resultant single permit for the new facility. It is anticipated that the permit application process will be twin tracked with the DCO application process, consolidating and varying the existing TV1 and TV2 permits.

2.5. DECOMMISSIONING

2.5.1. It is the assumption for the EIA that most elements of the Proposed Scheme will be decommissioned at the end of the operational lifespan, either prior to or at 30 years.

2.5.2. Most / all ground structures would be demolished and removed at ground level or just below. Any concrete materials would be crushed, with other materials such as metal, sorted and recycled where possible. Some removal of materials off-site is likely by road and possibly via rail and marine infrastructure.

2.5.3. Any below ground structures will be left in-situ, including piles, pipework and cables. Any pipework would be sealed.

2.5.4. It is anticipated that the decommissioning phase would take approximately 15 -18 months.

2.5.5. A Decommissioning Plan would be prepared at the appropriate time to confirm use of marine infrastructure available and appropriate at the time, other routes for offsite removal of materials and likely phasing of activities.

2.6. REFERENCES

Ref 2.1: Planning Inspectorate (2018). 'Advice Note 9: Rochdale Envelope'. Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-nine-rochdale-envelope/

Ref 2.2: International Civil Aviation Organisation (2021) 'CORSIA Default Lifecycle Emissions Values for CORSIA Eligible Fuels'. Available at: https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA_Eligible_Fuels/ICAO%20document%2006%20-%20Default%20Life%20Cycle%20Emissions%20-%20June%202022.pdf

Ref 2.3: International Council on Clean Transport (2021) 'Assessing the sustainability implications of Alternative Aviation Fuels'. Available at: https://theicct.org/publication/assessing-the-sustainability-implications-of-alternative-aviation-fuels/

3. APPROACH TO EIA

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 Regulation of 14(2)(a)-(f) and Schedule 4 to the EIA Regulations (**Ref 3.2**).

3.1.3. In line with Regulation 14(4)(a) of the EIA Regulations 2017 (**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

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:

- Stockton On Tees Borough Council;
- Redcar and Cleveland Borough Council;
- Middlesbrough Borough Council;
- Hartlepool Borough Council;
- Billingham Town Council;
- Tees Valley Combined Authority;
- Health and Safety Executive;
- Natural England;
- Historic England;
- Environment Agency;
- Civil Aviation Authority;
- National Highways Yorkshire and North East;
- Northumbrian Water;
- Public Health England;
- Marine Management Organisation;

- Teesport;
- Royal Society for the Protection of Birds (RSPB) – Salthome Nature Reserve; and
- Tees Valley Wildlife Trust.

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. Statutory consultation will be supported by a PEIR which will outline the likely significant environmental effects of the Proposed Scheme in advance of the DCO submission.

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 Study Area for each environmental topic is set out within the respective chapters of this report (see **Chapters 5-21**).

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 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 are set out within the respective chapters of this report (see **Chapters 5-21**).

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 Q1 of 2023 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. Baseline data which is deemed to be confidential in nature, such as that relating to protected species, will be provided in separate confidential appendices to the ES, due to the sensitivity of such species records.

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 private land, data will be collected from publicly accessible land only or obtained from other sources.

3.5. ESTABLISHING FUTURE BASELINE CONDITIONS

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

3.5.2. Throughout the EIA process the Applicant will consider developments to be included in the future baseline and development to be assessed as part of the cumulative effects assessment (see **Chapter 21: Cumulative Effects** of this report for further information).

3.6. CONSIDERATION OF ALTERNATIVES

3.6.1. Regulation 14(2)(d) of the EIA Regulations 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. The assessment of alternatives will include a consideration of alternative sites, alternative technologies, infrastructure locations, the construction strategy and best available technology (BAT) (where relevant). The PEIR and the ES will present the consideration of alternatives for the Proposed Scheme. The main reason for selecting the chosen options (location and technology) 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 (**Ref 3.5**) and 'Delivering Quality Development' (**Ref. 3.6)** 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 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 individual ES chapter for 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 further secondary mitigation measures (referred to as 'additional mitigation') will be outlined within the individual ES chapters. 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 mitigation will be included in the Consideration of Alternatives chapter of the ES and in the Design Report which will accompany the application for a DCO. The additional mitigation will be recorded in a summary chapter of the ES. In addition, a Register of Commitments will also document the additional mitigation to ensure suitable identification mitigation and monitoring beyond the application for a DCO. 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.

3.7.5. 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

3.7.6. The EIA Regulations (**Ref 3.7**) require, where appropriate, the monitoring of potential significant adverse effects. Where monitoring arrangements are proposed as part of the mitigation, this will be detailed within each of the topic chapters of the ES and within the Register of Commitments and draft DCO (as appropriate) and the results of any monitoring will be shared with 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, operation and decommissioning (including maintenance) phases of the Proposed Scheme and will report an estimate, by type and quantity, of expected residues and emissions.

3.8.2. The design of the Proposed Scheme will continue to be progressed and there will be a need to continue refining the design up to the detailed design stage, requiring a certain level of flexibility to be maintained. Therefore, in line with PINS Advice Note 9 (Using the Rochdale Envelope) (**Ref 3.8**), a Rochdale Envelope approach will be adopted to define the parameters within which the construction and operation of the Proposed Scheme will be undertaken. These will be defined within the Application drawings and the draft DCO.

3.8.3. The ‘parameters’ approach presents the maximum envelope within which the built development may be undertaken as assessment of the parameters ensures the comprehensive reasonable ‘worst case’ assessment of the full area within which the Proposed Scheme could be brought forward. This ensures the assessment of environmental effects associated with the Proposed Scheme will be the reasonable worst case, and that the actual development to be carried out within the 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, although design approvals from the relevant local planning authority will be required to confirm compliance with the assessed parameters.

3.8.4. 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 affected resource;
- Whether the effect is temporary or permanent (to be defined within the ES);

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

3.8.5. The methodology 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.

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

3.8.7. 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**
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

3.8.8. When a range (e.g. Major to Moderate) had been listed in **Table 3-1**. Significance criteria will be defined in accordance with technical guidance in the respective ES chapters. Where such guidance isn't available, professional judgement will be used to define the significance.

3.8.9. Only Moderate and Major effects are considered to be significant.

3.8.10. Within the ES, tables which summarise the likely significant effects will be provided within each technical chapter. These tables will outline sensitive receptors, mitigation measures and residual effects (i.e. once mitigation has been taken into account).

Distinctions will be made between direct and indirect; short, medium, and long-term; permanent and temporary; and positive and negative effects.

3.8.11. Inter-project cumulative effects of other existing and approved projects and intra-project combined effects (i.e. the cumulation of multiple environmental effects arising from the Proposed Scheme) will be considered in a separate section as outlined in **Chapter 21: Cumulative Effects** of this report.

3.9. ASSESSMENT OF TRANSBOUNDARY IMPACTS

3.9.1. Regulation 32 of the EIA Regulations 2017 (**Ref 3.9**) sets out the procedural duties required where the SoS deems that an NSIP is likely to have significant effects on the environment in an European Economic Area (EEA) State; or where an EEA State deems that its environment is likely to be significantly affected by an NSIP. Further guidance is provided in PINS' Advice Note 12 (**Ref 3.10**). As such, a description of any transboundary impacts that will be experienced as a result of the Proposed Scheme will be provided in the ES and this assessment of transboundary effects will be of effects experienced in other EEA States as a consequence of the Proposed Scheme. However, it is not anticipated that the Proposed Scheme will have significant transboundary effects.

3.10. ASSESSMENT OF HEAT AND RADIATION

3.10.1. Schedule 4 to the EIA Regulations 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. Further information on this can be found in **Chapter 10: Landscape and Visual** and **Chapter 19: Major Accidents and Disasters** of this report.

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 Ecology
  - Chapter 9 – Marine and Freshwater Ecology

  - Chapter 10 – Water Environment and Flood Risk
  - Chapter 11 – Landscape and Visual Impact
  - Chapter 12 – Climate Resilience
  - Chapter 13 – Greenhouse Gases
  - Chapter 14 – Materials and Waste
  - Chapter 15 - Socioeconomics
  - Chapter 16 – Traffic and Transport
  - Chapter 17 – Major Accidents and Disasters
  - Chapter 18 – Marine Navigation
  - Chapter 19 – Cumulative Effects
  - Chapter 20 – 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 application for a DCO. Such documents will be inclusive of, but not limited to the ES Non-Technical Summary (NTS) and a Register of Commitments.

3.12. COORDINATION OF ASSESSMENTS

3.12.1. There are several other associated assessments that will be undertaken to support the application for a DCO 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 (either a statutory designated Special Protection Area (SPA) or Special Area of Conservation (SAC)) (**Ref 3.11**).

3.12.3. Given the sensitivities of certain 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 3.12**) and an HRA will be prepared. If 'likely significant effects' (LSE) are identified, a detailed assessment will be provided to assess whether the proposals could result in adverse effects on the integrity of relevant International Sites. Further information on habitats and associated species can be found in **Chapter 7: Terrestrial Ecology**.

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 these processes have been considered to ensure a coordinated assessment.

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 BNG in connection with the Proposed Scheme. Further information on the approach to BNG can be found in **Chapter 7: Terrestrial Ecology** and **Chapter 8: Marine and Freshwater Ecology** of this report.

WATER FRAMEWORK DIRECTIVE (WFD) ASSESSMENT

3.12.6. The Water Framework Directive (WFD) assessment will comprise a screening assessment (Stage 1), scoping assessment (Stage 2), with the requirement for impact assessment (Stage 3) determined at the conclusion of the scoping stage. The WFD assessment 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.

FLOOD RISK ASSESSMENT (FRA)

3.12.7. As the Proposed Development is located within Flood Zone 2 and Flood Zone 3 areas, an FRA will be required (**Ref 3.13**). An FRA will be prepared to support the EIA in accordance with the National Planning Policy Framework (NPPF) (**Ref 3.14**). 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 hydraulic modelling of the proposed works, if required. The need and scope for hydraulic modelling will be discussed with the EA.

NAVIGATION RISK ASSESSMENT (NRA)

3.12.8. The overarching aim of the NRA is to determine, in view of the Proposed Scheme's location on the River Tees, whether the Proposed Scheme's marine infrastructure could lead to adverse effects on navigation within the river. The NRA will consist of river navigation analysis, the identification of baseline risk controls, stakeholder engagement and risk assessments. The NRA will inform the proposed Marine Navigation chapter of the ES.

3.13. ASSUMPTIONS AND LIMITATIONS

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

- The land requirements of the Proposed Scheme within the Site Boundary are yet to be wholly finalised;
- Potential areas for ecological mitigation and biodiversity net gain are yet to be confirmed; and
- The structure of the ES and coordination of additional supporting assessments are based on the Proposed Scheme design and parameters found in **Chapter 2: Site and Proposed Scheme Description**.

3.14. REFERENCES

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Ref 3.10: 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/

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Ref 3.13: DEFRA (2017) Guidance: 'Flood Risk Assessment in Flood Zones 2 and 3'. Available at: https://www.gov.uk/guidance/flood-risk-assessment-in-flood-zones-2-and-3

Ref 3.14: UK Government. (2021). 'Policy Paper: National Planning Policy Framework'.
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4. PLANNING AND ENERGY POLICY

4.1. INTRODUCTION

4.1.1. This chapter of the EIA Scoping Report provides an overview of the planning and energy policies of relevance to the Proposed Scheme, and where those policies identify the need for the Proposed Scheme.

4.1.2. The application for development consent will include a Planning Statement that will set out in more detail the policy of relevance to the Proposed Scheme and include an assessment of how it complies with that policy.

4.1.3. The following planning and energy policy is relevant to the Proposed Scheme:

- National Policy Statements for Energy;
- Energy and Climate Change Policy;
- The National Planning Policy Framework;
- Local Planning Policy; and
- Marine Policy.

4.1.4. These are considered throughout this chapter.

4.2. NATIONAL POLICY STATEMENTS FOR ENERGY

4.2.1. Under the Planning Act 2008 regime (**Ref 4.1**) (PA), the policy framework for examining and determining applications for development consent is provided by National Policy Statement (NPSs). Section 5 of the Planning Act 2008 allows the relevant SoS to designate NPSs setting out national policy in relation to the types of NSIPs listed at Section 14 of the Act. The NPSs are the primary policy used by the relevant SoS to examine and determine applications for NSIPs.

4.2.2. As the Proposed Scheme includes a Combined Cycle Gas Turbine (CCGT) Power Plant as a component which is considered a nationally significant infrastructure project as set out in Section 14 of the PA, Section 104 of the PA will be the decision-making criteria for this element and any associated high voltage overhead line elements or high voltage substations.

4.2.3. Section 104 of the PA provides that where a NPS has effect, the Secretary of State (SoS) must determine the application in accordance with the relevant NPSs and appropriate marine policy documents (if any) having regard to any local impact report produced by the relevant local planning authority; any matters prescribed in relation to development of the description to which the application relates; and any other matters which the SoS thinks are both "important and relevant" to their decision, unless this would:

- Lead to the UK being in breach of its international obligations;
- Be in breach of any statutory duty that applies to the SoS;
- Be unlawful;

- Result in the adverse impacts of the development outweighing the benefits; or
- Be contrary to any condition prescribing how decisions regarding an NSIP application are to be taken.

4.2.4. The Proposed Scheme, except for the aforementioned power elements, is considered as a project of national significance under Section 35 of the PA. Therefore, Section 105 of the PA will be the decision-making criteria for other elements of the Proposed Scheme, including the main gasification facility, hydroprocessing units and SAF product storage units.

4.2.5. Section 105 of the PA relates to decision on applications where no NPS has effect, that is, where there is no NPS in place relating to the specific type of development. In such cases, Section 105 states that in deciding the application the SoS must have regard to any relevant local impact report produced by the relevant local planning authority; any matters prescribed in relation to development of the description to which the application relates; and any other matters which the SoS thinks are both important and relevant to their decision.

CURRENT NPSs

4.2.6. A number of NPSs have been designated in relation to energy infrastructure. These were published in July 2011 by the Secretary of State (SoS) for the Department for Energy and Climate Change (now Energy Security and Net Zero) (**Ref 4.2**). The designated NPSs include an overarching NPS setting out general policies and assessment principles for energy infrastructure and a number of technology specific NPSs. The NPSs considered to be of relevance to the Proposed Scheme are:

- The Overarching NPS for Energy (EN-1) (of direct relevance to the CCGT and high voltage overhead line elements or high voltage substations, and important and relevant to the whole of the Proposed Scheme);
- The NPS for Fossil Fuel Electricity Generating Infrastructure (EN-2) (of direct relevance to the CCGT); and
- The NPS for Electricity Networks Infrastructure (EN-5) (of direct relevance to the high voltage overhead line elements or high voltage substations).

4.2.7. Part 2 of EN-1 covers the Government's energy and climate change strategy, including policies for mitigating climate change. Section 4.8 of EN-1 sets out generic considerations that applicants and the Examining Authority / SoS should take into account to help ensure that renewable energy infrastructure is resilient to climate change.

4.2.8. Part 3 of EN-1 'The need for new nationally significant energy infrastructure projects' defines and sets out the 'need' for nationally significant energy infrastructure. Paragraph 3.1.1 states that the UK needs all types of energy infrastructure covered by the NPS in order to achieve energy security at the same time as dramatically reducing greenhouse gas emissions. Paragraph 3.1.2 goes on to state that it is for industry to propose the type of energy

infrastructure and that the Government does not consider it appropriate for planning policy to set targets for or limits on different technologies.

4.2.9. Notably, paragraph 3.1.3 states that the SoS should assess applications for development consent for the types of infrastructure covered by the energy NPSs *"…on the basis that the Government has demonstrated that there is a need for those types of infrastructure…"* (with the scale and urgency of that need being described in the relevant part of EN-1). Paragraph 3.1.4 confirms that the SoS should give substantial weight to the contribution that all projects would make toward satisfying this need when considering applications under the PA 2008. As such, EN-1 is clear that the need that exists for new energy infrastructure is not open to debate or interpretation.

4.2.10. Part 4 of EN-1 sets out a number of 'assessment principles' that must be taken into account by applicants and the SoS in preparing and determining applications for nationally significant energy infrastructure. General points include (paragraph 4.1.2) the requirement for the SoS, given the level and urgency of need for the infrastructure covered by the energy NPSs, to start with a presumption in favour of granting consent for applications for energy NSIPs. This presumption applies unless any more specific and relevant policies set out in the relevant NPS clearly indicate that consent should be refused or any of the considerations referred to in Section 104 of the PA 2008 (**Ref 4.1**, noted above) apply.

4.2.11. Other assessment principles include the matters to be covered within any Environmental Statement (ES); the Habitats and Species Regulations (**Ref 4.3**); the consideration of alternatives; criteria for 'good design'; grid connection; consideration of Carbon Capture and Storage (CCS) and Carbon Capture Readiness (CCR); climate change adaptation; pollution control and environmental regulatory regimes; safety; hazardous substances; health; common law and statutory nuisance and security, amongst others.

4.2.12. Part 5 of EN-1 deals with the 'Generic Impacts' of energy infrastructure. These include impacts that occur in relation to all or most types of energy infrastructure in addition to others that may only be relevant to certain technologies. Paragraph 5.1.2 stresses that the list of impacts is not exhaustive and that applicants should identify the impacts of their projects in the ES in terms of both those covered by the NPSs and others that may be relevant. Generic impacts include land use; socio-economics; air quality and emissions; noise and vibration; dust, odour, artificial light, steam and smoke; traffic and transport; civil and military aviation; biodiversity and geological conservation; historic environment; landscape and visual; water quality and resources; flood risk and waste, amongst others. In relation to each of the generic impacts listed within Part 5, guidance is provided on how the applicant should assess these within their application and also the considerations that the SoS should take into account in decision-making.

4.2.13. EN-2 recognises the role of fossil fuel generating stations in the transition of the UK to a low carbon economy by providing reliable electricity supplies and a secure and diverse energy mix. It highlights the effectiveness of reducing fossil fuel generating stations' carbon emissions through development and deployment of carbon capture and storage technologies. It states that "*It is Government policy that all new coal-fired generating stations should be required to capture and store the carbon emissions from a substantial proportion of their capacity"*.

4.2.14. EN-5 sets out the factors (e.g. those influencing site selection) and 'assessment and technology specific' considerations to be taken into account in the preparation and assessment of applications for gas pipelines and electricity network infrastructure, including relevant environmental matters.

DRAFT REVISED NPSs

4.2.15. Revised draft NPSs for energy infrastructure were published by the Government for consultation in September 2021, partly in response to the Government's legally binding commitment to achieve net zero in terms of greenhouse gas emission by 2050. In March 2023, the Department for Energy Security and Net Zero (DESNZ) published the 'Consultation Response: Planning for New Energy Infrastructure, Draft National Policy Statements for energy infrastructure'. This Consultation Response document reiterates (at page 9) the profound and urgent need for electricity infrastructure and the role of renewable energy, stating:

"The overarching need case set out in the EN-1 document is clear that there is an urgent requirement for new electricity infrastructure and that renewables will play a key part in meeting government's commitments on net zero and energy security".

4.2.16. The Government launched a further consultation on updated versions of revised draft EN-1 to EN-5 – which ran from 30 March to 25 May 2023. This further consultation seeks views on various matters relating to renewables, carbon capture and hydrogen, oil and gas pipelines and electricity networks, including *"strengthening the electricity networks NPS to include more detail on the role of strategic planning of networks, which considers the network as a whole, rather than just individual transmission projects"*.

4.2.17. As yet, no date has been set for the designation of the revised energy NPSs. While the current suite of NPSs for energy infrastructure remain relevant Government policy and have effect for the purposes of the PA 2008, it is considered that the draft revised NPSs are a matter that is important and relevant to the Proposed Scheme. The following draft revised NPSs are considered to be relevant:

- Draft Overarching National Policy Statement for Energy (EN-1) (relevant to the whole of the Proposed Scheme);
- Draft National Policy Statement for Natural Gas Electricity Generating Infrastructure (EN-2) (relevant to the CCGT power plant); and

- Draft National Policy Statement for Electricity Networks Infrastructure (EN-5) (relevant to associated high voltage overhead line elements or high voltage substations).

4.2.18. Paragraph 2.1.2 of draft revised EN-1 (March 2023) states that *"To produce enough energy required for the UK and ensure it can be transported to where it is needed, a significant amount of infrastructure is needed at both local and national scale. High quality infrastructure is crucial for economic growth, boosting productivity and competitiveness"*.

4.2.19. Paragraph 3.3.3 states that *"To ensure that there is sufficient electricity to meet demand, new electricity infrastructure will have to be built to replace output from retiring plants and to ensure we can meet increased demand"*.

4.2.20. Paragraph 3.3.20 emphasises that there is an urgent need for new electricity generating capacity to meet the energy objectives. Paragraph 3.3.56 is clear that *"…all the generating technologies mentioned above* [including new electricity infrastructure, combustion power stations, and natural gas-fired plants] *are urgently needed to meet the Government's energy objectives"*.

4.2.21. Paragraph 3.4.4 recognises that *"We need a diverse mix of gas supply infrastructure including pipelines, storage and reception facilities in order to meet our energy objectives"*.

4.2.22. Draft revised EN-2 (March 2023) covers onshore natural gas-fired electricity generating infrastructure. It includes updates to reflect the role of natural gas in the transition to low carbon and net zero.

4.2.23. Paragraph 2.3.3 points out that natural gas generation stations are likely to be proposed for coastal or estuarine sites or inland river and that risks from flooding or rising sea levels are likely to increase. Therefore, applicants should in particular set out how the proposal would be resilient to coastal changes and increased risk from storm surge; for inland projects, increased risk of flash flooding from surface water or rivers; effects of higher temperatures, including higher temperatures of cooling water; and, increased risk of drought leading to a lack of available cooling water.

4.2.24. Draft revised EN-5 (March 2023) recognises that new electricity networks are required for electricity generation, storage and interconnection infrastructure are vital to achieving the nation's transition to net zero while maintaining energy security.

4.2.25. Paragraph 1.1.4 highlights the key role of new electricity networks, stating *"… the supporting onshore and offshore transmission infrastructure and related network reinforcements, are viewed by the government as being a critical national priority (CNP) and should be progressed as quickly as possible"*. To support the this, it is important to effectively plan the network to ensure the appropriate investment and the right kind of technology is in place.

4.2.26. Paragraph 1.1.6 goes onto confirm that *"the DESNZ-led Offshore Transmission Network Review (OTNR) and the Ofgem-led Electricity Transmission Network Planning Review (ETNPR) seek to deliver more strategic onshore and offshore transmission network planning, considering the networks as a whole, rather than just individual transmission projects"*. Paragraph 1.1.7 explains that this approach ensures that network development can allow decarbonisation targets to be met in the most efficient and timely manner. It also seeks to strike a balance between *"costs to consumers, timely delivery and the minimisation of community and environmental impacts of new network infrastructure from an early stage of network planning"*.

4.2.27. Draft revised EN-5 (2023) recognises that new electricity networks are required for electricity generation, storage and interconnection infrastructure are vital to achieving the nation's transition to net zero while maintaining energy security. Offshore networks form connections to the onshore network in the East of England.

4.2.28. Paragraph 1.1.4 highlights the key role of new electricity networks, stating *"… the supporting onshore and offshore transmission infrastructure and related network reinforcements, are viewed by the government as being a critical national priority (CNP) and should be progressed as quickly as possible"*. To support this, it is important to effectively plan the network to ensure the appropriate investment and the right kind of technology is in place.

4.2.29. Paragraph 1.1.6 goes onto confirm that *"the DESNZ-led Offshore Transmission Network Review (OTNR) and the Ofgem-led Electricity Transmission Network Planning Review (ETNPR) seek to deliver more strategic onshore and offshore transmission network planning, considering the networks as a whole, rather than just individual transmission projects."* Paragraph 1.1.7 explains that this approach ensures that network development can allow decarbonisation targets to be met in the most efficient and timely manner. It also seeks to strike a balance between *"costs to consumers, timely delivery and the minimisation of community and environmental impacts of new network infrastructure from an early stage of network planning"*.

4.3. ENERGY AND CLIMATE CHANGE POLICY

4.3.1. As noted above, Sections 104 and 105 of the Planning Act 2008 set out the matters that the SoS must have regard to in determining applications for development consent, which can include any other matters which the SoS thinks are "important and relevant" to their decision. Other matters that the SoS may consider important and relevant include recent UK energy and climate change policy.

4.3.2. The Proposed Scheme will support the overarching objective of the Government to continue transitioning the UK to a low carbon economy and meeting the legally binding target of net zero greenhouse gas emissions by 2050. The recent energy and climate change policy that are relevant include:

- The Ten Point Plan for a Green Industrial Revolution (November 2020);
- The Energy White Paper (December 2020);
- Industrial Decarbonisation Strategy (March 2021);
- Net Zero Strategy: Build Back Greener (October 2021);
- British Energy Security Strategy (April 2022);
- Jet Zero Strategy (July 2022); and,
- Powering Up Britain (March 2023).

THE TEN POINT PLAN FOR A GREEN INDUSTRIAL REVOLUTION (NOVEMBER 2020)

4.3.3. '*The Ten Point Plan for a Green Industrial Revolution – Building back better, supporting green jobs, and accelerating out path to net zero*', was published on 18 November 2020 (**Ref 4.4**) and is aimed at delivering a 'Green Industrial Revolution' in the UK, with the foreword by the Prime Minister stating that the Plan will aim to mobilise £12 billion of government investment and potentially three times as much from the private sector, to create and support up to 250,000 green jobs.

4.3.4. '*Point 6: Jet Zero and Green Ships*' sets out immediate steps to drive the uptake of sustainable aviation fuels. A Jet Zero Council has been established as a sector-wide partnership to accelerate the development and adoption of new technologies to help develop a strategy to reach net zero aviation. In addition, £15 million is being invested into FlyZero which is a 12-month study into the strategic, technical and commercial issues in designing and developing zero-emission aircraft that could enter service in 2030. Furthermore, a £15 million competition was held to support the production of Sustainable Aviation Fuels (SAF) in the UK, in which the Applicant was awarded funding. A consultation also ran from 30 March 2023 to 22 June 2023 on a Sustainable Aviation Fuel mandate to blend greener fuels into kerosene, which will create a market-led demand for these alternative fuels.

4.3.5. '*Point 10: Green Finance and Innovation*' sets out the vision for the UK to be a global leader in the technologies needed to decarbonise our economies and transition to net zero. It states '*To accelerate the commercialisation of innovative low-carbon technologies, systems and processes in the power, buildings, and industrial sectors, we will launch the £1 billion Net Zero Innovation Portfolio. The portfolio will focus on ten priority areas that correspond with this Ten Point Plan, including… energy storage and flexibility; bioenergy; industrial fuel switching*…' Point 10 also highlights that there will be £100 million provided for Energy Storage and Flexibility innovation challenges.

THE ENERGY WHITE PAPER (DECEMBER 2020)

4.3.6. The Energy White Paper 'Powering our Net Zero Future' ('EWP') (**Ref 4.5**) was presented to Parliament in December 2020 and builds on the Ten Point Plan. At the core of the EWP is the commitment to tackle climate change and achieve

net zero. The EWP seeks to put in place a strategy for the wider energy system that transforms energy, supports a green recovery and creates a fair deal for consumers (page 4). As with the Ten Point Plan, the EWP confirms the Government's support for new hydrogen technologies and CCUS drawing upon the resources provided by the North Sea.

4.3.7. The Government estimates (Introduction, page 15) that the measures in the EWP could reduce emissions across power, industry and buildings by up to 230Mt CO2 in the period to 2032 and enable further savings in other sectors such as transport. In doing so, these measures could support up to 220,000 jobs per year by 2030. These figures include the energy measures from the Ten Point Plan as well as additional measures set out in the EWP. However, the EWP recognises that more will need to be done to meet key milestones on the journey to net zero.

4.3.8. The EWP (pages 16 to 17) provides an overview of the Government's key commitments to put the UK on a course to net zero. These are grouped under a number of headings and include:

"SUPPORT A GREEN RECOVERY FROM COVID-19 …

- *Increasing the ambition in our Industrial Clusters Mission four-fold, aiming to deliver four low-carbon clusters by 2030 and at least one fully net zero cluster by 2040.*
- *Investing £1 billion up to 2025 to facilitate the deployment of CCUS in two industrial clusters by the mid-2020s, and a further two clusters by 2030, supporting our ambition to capture 10Mt per year by the end of the decade."*

4.3.9. Chapter 2 'Power' of the EWP sets out how it is proposed to decarbonise the power sector in terms of generation of electricity. This includes an expansion of other low-cost renewable technologies in addition to offshore wind. This proposal is aligned with the Ten Point Plan which suggests continuing to hold regular Contracts or Difference (CfD) auction rounds every two years to bring forward a range of low-cost renewable technologies. Subject to projects coming forward, the intention is to double the capacity awarded in the last round with the aim to deploy around 12GW of low-cost renewable generation.

4.3.10. Chapter 2 also sets out the how it is proposed to achieve net zero aviation, including establishing the Jet Zero Council to accelerate the development and adoption of new technologies, and investing £15 million into FlyZero as well as running a £15 million competition to support the production of sustainable aviation fuels in the UK, which is aligned with Point 6 set out in the Ten Point Plan.

4.3.11. Chapter 5 'Industrial Energy' sets out the goal for emissions from industry to fall by around 90% from today's levels by 2050. In order to achieve this (page 118) the Government:

"…will:

- *Create a sustainable future for UK manufacturing industry through improved energy efficiency and the adoption of clean energy technologies"*

4.3.12. The EWP confirms that manufacturing and refineries, which form the bulk of industrial emissions, still account for around 1% of the UK's greenhouse gas emissions. About half of those emissions are concentrated in the UK's six major industrial clusters. This includes Teesside (Figure 8.1, page 121) which accounts for 3.9 Mt CO2 e of emissions (2018 figures).

4.3.13. In order to transform industrial energy, the EWP (page 122) states that we cannot rely on energy efficiency alone to reduce emission in line with the Government's 2050 goal. Manufacturing industry will also need to capture its carbon for onward transport and storage and switch from using fossil fuels to low-carbon alternatives.

4.3.14. In order to bring about change in the industry, the EWP includes a commitment (page 124) to increase the 'Industrial Clusters Mission' to support the delivery of four low-carbon industrial clusters by 2030 and at least one fully net zero cluster by 2040.

INDUSTRIAL DECARBONISATION STRATEGY (MARCH 2021)

4.3.15. The Industrial Decarbonisation Strategy (**Ref 4.6**) is the first strategy published by a major economy, which sets out how industry can be decarbonised in line with net zero, while remaining competitive and without pushing emissions abroad. It builds on the Ten Point Plan and sets out the Government's vision for a prosperous, low carbon UK industrial sector by 2050, and aims to provide industry with the long-term certainty it needs to invest in decarbonisation.

4.3.16. The Ministerial Foreword (page 6) emphasises that the 2020s will be crucial to industrial decarbonisation, with the UK needing to deploy key technologies such as CCUS while beginning the journey of switching from fossil fuel combustion to low carbon alternatives such as electricity and bioenergy.

4.3.17. Chapter 4 'Adopting low-regret technologies and building infrastructure' states *"To be on track to deliver net zero, we expect that the minimum, in all future scenarios, is 20 TWh per year of fossil fuel use replaced with low carbon alternatives in 2030"*. It goes onto state that *"Current evidence strongly suggests that, given limited sustainable biomass supply, we may need to prioritise the use of biomass where it can be combined with carbon capture and storage (BECCS), resulting in negative emissions"*.

NET ZERO STRATEGY: BUILD BACK GREENER (OCTOBER 2021)

4.3.18. The 'Net Zero Strategy: Build Back Greener' (**Ref 4.7**) expands on key commitments in the Ten Point Plan and the EWP and sets out the next steps the Government proposes to take to cut emissions, seize green economic opportunities and leverage further private investment into net zero. The Strategy sets an indicative delivery pathway for emissions reductions to 2037 by

sector. It is intended to put the UK on the path for Carbon Budget 6 and ultimately on course for net zero by 2050.

4.3.19. One of the key policies set out in relation to transport is to *"Aim to become a world-leader in zero emission flight and kick-starting the commercialisation of the UK sustainable aviation fuel (SAF) so people can fly, and connect without guilt. Our ambition is to enable delivery of 10% SAF by 2030 and will be supporting UK industry with £180 million funding for the development of SAF plants"*. This policy is aligned with Point 6 set out in the Ten Point Plan.

BRITISH ENERGY SECURITY STRATEGY (APRIL 2022)

4.3.20. The British Energy Security Strategy was published in April 2022 (**Ref 4.8**) largely in response to soaring energy prices as a result of a sudden surge in demand following the COVID-19 pandemic, compounded by the Russian invasion of Ukraine. Much of the focus of the Energy Strategy is upon providing financial assistance to families and businesses struggling with higher energy bills, but it also looks at improved energy efficiency, reducing the amount of energy we need and addressing the underlying vulnerability to international oil and gas prices by reducing the UK's dependence on imported oil and gas.

4.3.21. The Strategy aims to expand the UK's renewable capacity by investing in the North Sea so that we are not wholly dependent on other countries for fuel, from industrial production to net zero aviation.

JET ZERO STRATEGY (JULY 2022)

4.3.22. Jet Zero Strategy (**Ref 4.9)** includes a 5-year delivery plan, setting out how the Government will achieve net zero aviation by 2050. The Strategy sets out the Government's vision for decarbonising aviation, focussing on the development of technologies in a way that maintains the benefits of air travel, especially post COVID 19, whilst maximising the opportunities that decarbonisation can bring for the UK.

4.3.23. The Strategy points out that SAF is currently commercially available, but not at the scale that is required to decarbonise the aviation sector. Therefore, the Government is committed to having at least five UK SAF plants under construction by 2025 and a SAF mandate in place with a target of at least 10% SAF by 2030. It also emphasises the Government's proactivity in "*looking at how to create the long-term conditions for investable projects in the UK, by continuing to engage stakeholders to gather key evidence and determine what further measures industry or government might be able to take*".

POWERING UP BRITAIN (MARCH 2023)

4.3.24. The DESNZ published 'Powering up Britain' (**Ref 4.10)** and constituent documents in March 2023 which include 'Powering up Britain: Energy Security Plan' and 'Powering Up Britain: Net Zero Growth Plan'.

4.3.25. "Powering up Britain" sets out the Government's priority to be energy independent in light with the invasion in Ukraine. It highlights the Government's mission to replace fossil fuels with renewable energy. It also confirms that the Government is making positive progress towards zero emission flights.

4.3.26. 'Powering Up Britain: Net Zero Growth Plan' further sets out the steps that the DESNZ is taking to ensure the UK is more energy independent, secure and resilient. It recognises the targeted public investment that the Government has delivered for SAFs, for example, through the Advanced Fuels Fund. The Plan sets out key commitments in the transport sector, which include welcoming the Independent Review of Net Zero's recognition of the important role for low carbon fuels (LCFs) in decarbonising sectors such as aviation and maritime. It states "*We continue to make progress delivering on our ambitions for a thriving domestic sustainable aviation fuel (SAF) market, supported by a comprehensive policy package that includes a further consultation on our SAF mandate, responding to the Government-commissioned independent evaluation of developing a sustainable long-term UK SAF industry, and launching a second application window for the £165 million Advanced Fuels Fund".*

4.4. NATIONAL PLANNING POLICY FRAMEWORK

4.4.1. The NPPF, introduced in March 2012 (updated July 2021), sets out the Government's planning policies for England. It is a material consideration in planning decisions. Although paragraph 5 of the NPPF confirms that NSIPs are to be determined in accordance with the decision-making framework of the PA 2008 and relevant NPSs, decisions on NSIPs should also take account of any other matters that are "relevant", which may include the NPPF. The NPPF is supported by the Planning Practice Guidance (PPG), which provides more detailed guidance on various aspects of planning.

4.4.2. Section 2 'Achieving sustainable development' confirms (paragraph 7) that the purpose of the planning system is to contribute to the achievement of sustainable development, summarised as *"meeting the needs of the present without compromising the ability of future generations to meet their own needs".* Paragraph 8 goes on to identify three overarching objectives to the achievement of sustainable development, which are interdependent and need to be pursued in mutually supportive ways. These are:

- **An Economic Objective** – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;
- **A Social Objective** – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed, beautiful and safe places, with accessible services and open spaces that reflect

current and future needs and support communities' health, social and cultural well-being; and

- **An Environmental Objective** – to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

4.4.3. The NPPF is supportive of infrastructure projects. One of the methods of fulfilling the objective of sustainable development listed at paragraph 8 under 'a) an economic objective' is through the "*provision of infrastructure*". Central to the NPPF is 'a presumption in favour of sustainable development', which is set out in Paragraph 11.

4.4.4. Paragraph 152 in Section 14 'Meeting the challenge of climate change, flooding and coastal change' states that:

"The planning system should support the transition to a low carbon future in a changing climate … 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".

4.4.5. Paragraph 158 states that when determining applications for renewable and low carbon development, there should be no requirement for applicants to demonstrate the overall need for renewable or low carbon energy and that applications for renewable or low carbon development should be approved if their impacts are (or can be made) acceptable.

4.4.6. NPPF policies of particular relevance include:

- Building a strong, competitive economy;
- Making effective use of land;
- Meeting the challenge of climate change, flooding and coastal change; and
- Conserving and enhancing the natural environment.

4.5. LOCAL PLANNING POLICY

DEVELOPMENT PLAN DOCUMENTS

4.5.1. The proposed site for the fuel project is located wholly within the administrative boundary of Stockton-on-Tees Borough Council (STBC).

4.5.2. The relevant development plan documents (DPDs) for the Site are therefore as follows:

- Stockton-on-Tees Borough Council Local Plan (adopted January 2019) (**Ref 4.12**);
- Stockton-on-Tees Borough Council Local Plan Policies Map (adopted January 2019); and,

- The Tees Valley Joint Minerals and Waste DPDs (adopted September 2011).

4.5.3. The Tees Valley Joint Minerals and Waste DPDs comprise a Minerals and Waste Core Strategy DPD and a Minerals and Waste Policies and Sites DPD. The Joint Minerals and Waste DPDs were prepared together by Darlington, Hartlepool, Middlesbrough, Redcar and Cleveland and Stockton-on-Tees. The Joint Minerals and Waste DPD is of limited relevance to the Proposed Scheme.

PLANNING ALLOCATIONS/DESIGNATIONS

4.5.4. The key planning allocations/designation and related policies (based upon the relevant policies maps) that apply to the Site are listed below:

- Specialist Use Locations – Policies SD4 and EG4;
- Specialist Employment Allocations – Policies SD4 and EG4; and
- Limits to Development – Policies SD3, SD4 and SD5.

NEIGHBOURHOOD PLANS

4.5.5. There are no adopted and emerging neighbourhood plans within STBC that apply to the Proposed Scheme.

KEY POLICY SUMMARY

4.5.6. **Table 4-1** below details key below outlines the key policies from the Stockton-on-Tees Borough Council Local Plan 2019 of relevance to the Proposed Scheme.

Table 4-1 - Stockton-on-Tees Borough Council Local Plan 2019: Key Policies Summary

Policy	Policy Consideration
Policy ENV 1 – Energy Efficiency	The Council will encourage all development to minimise the effects of climate change through meeting the highest possible environmental standards during construction and occupation. The Council will: a. Promote zero carbon development and require all development to reduce carbon dioxide emissions by following the steps in the energy hierarchy, in the following sequence: i. Energy reduction through 'smart' heating and lighting, behavioural changes, and use of passive design measures; then, ii. Energy efficiency through better insulation and efficient appliances; then, iii. Renewable energy of heat and electricity from solar, wind, biomass, hydro and geothermal sources; then iv. Low carbon energy including the use of heat pumps, Combined Heat and Power and Combined Cooling Heat and Power systems; then v. Conventional energy. All major developments must demonstrate how they contribute to the greenhouse gas emissions reduction targets set out in Stockton-on-Tees' Climate Change Strategy 2016; and support and encourage sensitive energy efficiency improvements to existing buildings.
Policy ENV 2 - Renewable and Low	Planning applications for energy generation from renewable and low carbon sources, other than wind energy generation, will be considered against the principles in Policy SD8. Proposals should be supported by a comprehensive assessment of the

Policy	Policy Consideration
Carbon Energy Generation	landscape, visual and any other impacts of the proposal. Developers should, where appropriate, provide details alongside a planning application of a satisfactory scheme to restore a site to at least its original condition when the scheme has reached the end of its operational life.
Policy ENV 3 – Decentralised Energy Generation and Supply	The Council will promote and support decentralised energy such as District Heat and Power Networks through a number of methods. The Council will require all major development to investigate the use of decentralised energy networks for heat and power as part of the feasibility assessment and energy statement.
Policy ENV4 - Reducing and Mitigating Flood Risk	All new development will be directed towards areas of the lowest flood risk to minimise the risk of flooding from all sources, and will mitigate any such risk through design and implementing sustainable drainage (SuDS) principles. Development on land in Flood Zones 2 or 3 will only be permitted following: a. The successful completion of the Sequential and Exception Tests (where required); and b. A site specific flood risk assessment, demonstrating development will be safe over the lifetime of the development, including access and egress, without increasing flood risk elsewhere and where possible reducing flood risk overall. Site specific flood risk assessments will be required in accordance with national policy.
Policy ENV5 – Preserve, Protect and Enhance Ecological Networks, Biodiversity and Geodiversity	The Council will protect and enhance the biodiversity and geological resources within the Borough. Development proposals will be supported where they enhance nature conservation and management, preserve the character of the natural environment and maximise opportunities for biodiversity and geological conservation particularly in or adjacent to Biodiversity Opportunity Areas in the River Tees Corridor, Teesmouth and Central Farmland Landscape Areas. Ecological networks and wildlife corridors will be protected, enhanced and extended. A principal aim will be to link sites of biodiversity importance by avoiding or repairing the fragmentation and isolation of natural habitats. Nationally designated sites - Development that is likely to have an adverse effect on a site, including broader impacts on the national network of Sites of Special Scientific Interest (SSSI) and combined effects with other development, will not normally be allowed. Development proposals should seek to achieve net gains in biodiversity wherever possible. It will be important for biodiversity and geodiversity to be considered at an early stage in the design process so that harm can be avoided and wherever possible enhancement achieved (this will be of particular importance in the redevelopment of previously developed land where areas of biodiversity should be retained and recreated alongside any remediation of any identified contamination).
Policy ENV6 - Green Infrastructure, Open Space, Green Wedges and Agricultural Land	The Council will protect and support the enhancement, creation and management of all green infrastructure to improve its quality, value, multi-functionality and accessibility in accordance with the Stockton-on-Tees Green Infrastructure Strategy and Delivery Plan. Green infrastructure should be integrated, where practicable, into new developments. This includes new hard and soft landscaping, and other types of green infrastructure. Proposals should illustrate how the Proposed Scheme will be satisfactorily integrated into the surrounding area in a manner appropriate to the surrounding townscape and landscape setting and enhances the wider green infrastructure network. The loss of open space as shown on the Policies Map, and any amenity open space, will not be supported unless: a. it has been demonstrated to be surplus to requirements; or b. the loss would be replaced by equivalent or better provision in terms of quantity and quality in a suitable location; or c. the proposal is for another sports or recreational provision, the needs for which, clearly outweigh the loss; or d. the proposal is ancillary to the use of the open space; and

Policy	Policy Consideration
	e. in all cases there would be no significant harm to the character and appearance of the area or nature conservation interests. Development proposals will be expected to demonstrate that they avoid the 'best and most versatile' agricultural land unless the benefits of the proposal outweigh the need to protect such land for agricultural purposes. Where significant development of agricultural land is demonstrated to be necessary, proposals will be expected to demonstrate that they have sought to use areas of lower quality land in preference to that of a higher quality.
Policy ENV7 – Ground, Air, Water, Noise and Light Pollution	All development proposals that may cause groundwater, surface water, air (including odour), noise or light pollution either individually or cumulatively will be required to incorporate measures as appropriate to prevent or reduce their pollution so as not to cause unacceptable impacts. Where development has the potential to lead to significant pollution either individually or cumulatively, proposals should be accompanied by a full and detailed assessment of the likely impacts. Development will not be permitted when it is considered that unacceptable effects will be imposed on human health, or the environment, taking into account the cumulative effects of other proposed or existing sources of pollution in the vicinity. Development will only be approved where suitable mitigation can be achieved that would bring pollution within acceptable levels.
Policy HE1 – Conservation and Enjoyment of the Historic Environment	To ensure the conservation and enjoyment of the Borough's historic environment the Council will: a. Maintain and promote the use of Historic Environment Records; b. Review and regularly update the SPD4 Conservation and Historic Environment Folder or any successor. This will include review and regular update of: i. Conservation Area Appraisals and Management Plans; ii. Article 4 directions, and; iii. Local List.
Policy HE2 – Conserving and Enhancing Stockton's Heritage Assets	In order to promote and enhance local distinctiveness, the Council will support proposals which positively respond to and enhance heritage assets. Where development has the potential to affect heritage asset(s) the Council require applicants to undertake an assessment that describes the significance of the asset(s) affected, including any contribution made by their setting. Appropriate desk-based assessment and, where necessary, field evaluation will also be required where development on a site which includes or has the potential to include heritage assets with archaeological interest. Applicants are required to detail how the proposal has been informed by assessments undertaken. Development proposals should conserve and enhance heritage assets, including their setting, in a manner appropriate to their significance. Where archaeological remains survive, whether designated or not, there will be a presumption in favour of their preservation in-situ. The more significant the remains, the greater the presumption will be in favour of this.
Policy HE3 – Stockton & Darlington Railway	The Council will require any proposal for development on or adjacent to the line(s) to show how the proposal has regard to the preservation of any physical remains along the route(s) and their interpretation on the ground, and otherwise respects and interprets the route(s) where those remains no longer exist.
Policy SD1 - Presumption in favour of Sustainable Development	In accordance with the Government's NPPF, when the Council considers development proposals it will take a positive approach that reflects the presumption in favour of sustainable development contained in the NPPF. It will always work proactively with applicants jointly to find solutions which mean that proposals for sustainable development can be approved wherever possible, and to secure development that improves the economic, social and environmental conditions in the area. Planning applications that accord with the policies in this Local Plan (and, where relevant, with polices in neighbourhood plans) will be approved without delay, unless material considerations indicate otherwise.

Policy	Policy Consideration
Policy SD2 – Strategic Development Needs	The following strategic growth needs have been identified for the period 2017/18 to 2031/32, which will be met through new sustainable development and infrastructure provision that integrates positively with the natural, built and historic environment of the Borough. Aside from Economic and Growth and Housing, where other needs are identified, new developments will be encouraged to meet that need in the most sustainable locations having regard to relevant policies within the Local Plan.
Policy SD5 - Natural, Built and Historic Environment	To ensure the conservation and enhancement of the environment alongside meeting the challenge of climate change the Council will Conserve and enhance the natural, built and historic environment through a variety of methods, meet the challenge of climate change, flooding and coastal change through a variety of methods and conserve and enhance the historic environment through a variety of methods.
Policy SD6 – Transport and Infrastructure Strategy	To ensure the road network is safe and there are reliable journey times, the Council will prioritise and deliver targeted improvements at key points on the local road network and work in conjunction with Highways England to deliver improvements at priority strategic locations on the strategic road network.
Policy SD8 – Sustainable Design Principles	The Council will seek new development to be designed to the highest possible standard, taking into consideration the context of the surrounding area. All proposals will be designed with public safety and the desire to reduce crime in mind, incorporating, where appropriate, advice from the Health and Safety Executive, Secured by Design, or any other appropriate design standards.

4.6. MARINE POLICY

THE MARINE POLICY STATEMENT 2011

4.6.1. Section 104 of the PA 2008 requires the SoS to have regard to "…the appropriate marine policy documents…" relevant to the NSIP. Elements of the Proposed Development may involve works within the UK Marine Area.

4.6.2. The appropriate marine policy documents are defined at Section 59 of 'The Marine and Coastal Access Act 2009'. These include any marine policy statement which is in effect and to the extent that a decision relates to a marine plan area, any marine plan which is in effect for that area (Section 59(3) and (5).

4.6.3. The UK Marine Policy Statement ('MPS'), adopted in March 2011, provides the policy framework for preparing marine plans and taking decisions affecting the marine environment. It has been prepared and adopted for the purposes of Section 44 of the Marine and Coastal Access Act 2009 and is intended to sit alongside terrestrial consenting regimes, including the PA 2008 regime. The MPS was subject to updates in September 2020 relating to how references to EU law should be interpreted from 1 January 2021 following the UK's withdrawal from the EU.

4.6.4. Chapter 2 of the MPS outlines the vision for the UK marine area, the high-level approach to marine planning and general principles for decision making covering economic, social and environmental considerations. It also covers detailed considerations relevant to developments such as marine ecology and biodiversity; air quality; noise; water quality and resources; seascape; historic environment; climate change adaptation and mitigation; and coastal change and flooding.

4.6.5. Chapter 3 sets out the policy objectives for key activities that take place in the marine environment. Section 3.3 deals specifically with 'Energy production and infrastructure development'. Paragraph 3.3.1 notes that a secure, sustainable and affordable supply of energy is of central importance to the economic and social well-being of the UK. Paragraph 3.3.4 sets out issues that decision maker should take into account when examining and determining applications for energy infrastructure.

4.6.6. Paragraph 3.3.6 recognises that in some parts of the UK power stations may be sited in coastal locations and will have an important contribution to play in the UK's energy mix. It notes that the construction, operation or decommissioning of power stations may have impacts on the local marine environment through the construction of plants and associated development. It refers to more detail on likely impacts and specific measures and actions to avoid or minimise adverse impacts, including those on marine ecology, being contained within the NPSs, including EN-2 in respect of gas generating stations.

GUIDANCE TO THE MARINE POLICY STATEMENT 2021

4.6.7. The Guidance which was updated in September 2020 is jointly agreed by the policy authorities and explains how references to EU law in the UK Marine Policy Statement (MPS) should be interpreted from 1 January 2021 following the UK's withdrawal from the EU.

4.6.8. The European Union (Withdrawal) Act 2018 will convert many EU measures into UK law. Former EU measures converted into UK law are referred to as 'retained EU law' with statutory instruments amending the retained EU law to ensure it is operable.

4.6.9. References in the MPS to EC or EU legislation, EU legislative requirements, European legislation and EU requirements are to be read as references to retained EU law from 1 January 2021

NORTH EAST INSHORE AND NORTH EAST OFFSHORE MARINE PLAN 2021

4.6.10. Marine plans are intended to set out detailed policy and spatial guidance for a particular area. The UK is divided into a number of marine planning regions with associated plan authorities that are responsible for preparing marine plans. In England the Marine Management Organisation ('MMO') is the plan authority. Marine plans are a material consideration.

4.6.11. The Site lies within the 'North East Inshore Marine Area', which stretches from Flamborough Head in Yorkshire to the Scottish Border. The Plan Area has three main tidal rivers, including the River Tees.

4.6.12. The North East Marine Plan is intended to provide a strategic approach to decision-making, considering future use and providing a clear approach to managing resources, activities and interactions within the area. In referring to Teesside, Tyneside and Wearside (paragraph 14), the Plan identifies that these are industrial areas, with important manufacturing heritage. North Sea oil and

gas reserves mean that oil and gas production and processing are important activities in the north east marine plan areas, with product being transferred to shore via pipelines, for example at Teesside

4.6.13. The Plan contains a number of policies (Table 2). There are no specific policies on waste to fuel aviation fuel facilities.

4.6.14. Policy NE-INF-1 supports appropriate land-based infrastructure which facilitates marine activity and vice versa.

4.6.15. Policy NE-INF-2 supports the protection of landing facilities in the north east inshore marine area, and confirms these are critical for enabling industries. By protecting existing landing facilities, identifying the difference in safeguarding, NE-INF-2 mirrors similar provisions in terrestrial planning and supports the continued operation of vital existing landing facilities.

4.6.16. Policy NE-CO-1 supports proposals that optimise the use of space and incorporate opportunities for co-existence and cooperation with existing activities. It acknowledges that the north east marine plan areas, and in particular the inshore area, are likely to be busier in the future, and use of the space may become limited. The policy ensures that new proposals will avoid creating conflicts and to minimise their footprint where possible.

4.6.17. Policy REN-1 confirms that proposals that enable the provision of renewable energy technologies and associated supply chains, will be supported. Renewable energy technologies contribute to the diversification and decarbonisation of the electricity grid. NE-REN-2 protects areas identified for energy developments from other activities that could affect the sites ability to generate energy. It enables the development of safe, profitable and efficient marine businesses.

4.6.18. Supporting development associated with industrial clusters also aims to enhance connectivity between marine operations and land infrastructure. This policy will also benefit employment in coastal communities near industrial clusters, supporting the NE -INF1 and NE -EMP -1 policies.

4.6.19. It is considered that the Proposed Development is consistent with policy contained within the UK Marine Policy Statement and the North East Marine Plan.

4.7. REFERENCES

Ref 4.1: HM Government (2008) Planning Act 2008. Available at: https://www.legislation.gov.uk/ukpga/2008/29/contents

Ref 4.2: Department for Energy Security & Net Zero (2023) 'Overarching National Policy Statement (NPS) for Energy EN-1'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf

Ref 4.3: HM Government (2017) The Conservation of Habitats and Species Regulation 2017. Available at: https://www.legislation.gov.uk/uksi/2017/1012/contents/made

Ref 4.4: HM Government (2020) 'The Ten Point Plan for a Green Industrial Revolution' Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936567/10_POINT_PLAN_BOOKLET.pdf

Ref 4.5: HM Government (2020) Energy White Paper: 'Powering our Net Zero Future'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/945899/201216_BEIS_EWP_Command_Paper_Accessible.pdf

Ref 4.6: HM Government (2021) 'Industrial Decarbonisation Strategy' Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/970229/Industrial_Decarbonisation_Strategy_March_2021.pdf

Ref 4.7: HM Government (2021) 'Net Zero Strategy: Build Back Greener' Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf

Ref 4.8: Department for Business, Energy & Industrial Strategy, Department for Energy Security and Net Zero and Prime Minister's Office (2022) British Energy Security Strategy. Available at: https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy

Ref 4.9: Department for Transport (2022) 'Jet Zero Strategy' Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1095952/jet-zero-strategy.pdf

Ref 4.11: HM Government (2023) 'Powering up Britain' Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147340/powering-up-britain-joint-overview.pdf

Ref 4.12: Stockton-on-Tees Borough Council (2019) 'Local Plan'. Available at: https://www.stockton.gov.uk/media/2518/Local-Plan-2019/pdf/Local_Plan_2019.pdf?m=637810468860870000

Ref 4.13: HM Government (2011) UK Marine Policy Statement. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf

Ref 4.14: Department for Environment, Food & Rural Affairs (2021) Guidance to the UK Marine Policy Statement from January 2021. Available at: https://www.gov.uk/government/publications/uk-marine-policy-statement/guidance-to-the-uk-marine-policy-statement-from-1-january-2021

Ref 4.15: HM Government (2021) North East Inshore and North East Offshore Marine Plan. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004484/FINAL_North_East_Marine_Plan__1_.pdf

5. AIR QUALITY

5.1. INTRODUCTION

5.1.1. 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 would 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 shown in **Table 5-1**.

Table 5-1 – 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. 5.1**) and NPS for Fossil Fuel Generating Infrastructure (EN-2) 2011 (**Ref 5.2**)	The Overarching NPS for Energy (EN-1) and EN-2 makes reference to issues of air quality on the basis of emissions from generating stations or associated plant and discusses the potential for eutrophication of habitats as a result of nutrient deposition from emissions.
Draft Overarching NPS for Energy (EN-1) 2023 (**Ref. 5.3**) and Draft NPS for Natural Gas Electricity Generating Infrastructure (EN-2) 2023 (**Ref 5.4**)	The Draft Overarching NPS for Energy (EN-1) and Draft EN-2 2023 update builds on the previous 2011 statement with reference to the new $PM_{2.5}$ targets set under the Environment Act 2021 included. The draft states that the Secretary of State must consider duties under other legislation including duties under the Environment Act 2021 in relation to environmental targets and have regard to policies set out in the Government's Environmental Improvement Plan in decision making.
National Planning Policy Framework (**Ref. 5.5**)	The National Planning Policy Framework (NPPF) states that the planning system should manage growth such that local air quality should be improved. Decisions on planning should take into account the presence of Air Quality Management Areas (AQMA) and Clean Air Zones (CAZ) and the cumulative impacts from multiple local developments. Opportunities to improve air quality should be identified and encouraged through measures at the design stage and within the planning system.
The Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2) (**Ref. 5.6**)	The AQS for England, Scotland, Wales and Northern Ireland was produced in response to the requirements described in the Environment Act 1995 for the production of an air quality strategy. The 2007 strategy is now due for update and as part of the Environment Act 2021 is now

Policy / Legislation / Guidance	Description
	due to be updated with a frequency of five years and approved within 12 months of review.
Clean Air Strategy 2019 (**Ref. 5.7**)	The Clean Air Strategy was produced by the UK Government in response to numerous, successful court challenges to the Government's strategy to improve air quality. The strategy identifies sources of air pollution at a national level and outlines aspirations for improvement.
Environmental Improvement Plan 2023 (**Ref. 5.8**)	The Environmental Improvement Plan sets out the intended legally binding, long-term targets that both reduce concentrations of, and drive down human exposure to $PM_{2.5}$. Secondary legislation is required for these to be implemented in law. The interim and long-term targets are: By the end of January 2028: ■ The highest annual mean concentration in the most recent full calendar year must not exceed 12 µg/m³ of $PM_{2.5}$. ■ Compared to 2018, the reduction in population exposure to $PM_{2.5}$ in the most recent full calendar year must be 22% or greater. By the end of 2040: ■ A maximum Annual Mean Concentration Target (AMCT) of 10 µg/m³ for $PM_{2.5}$ should be achieved. Population exposure to $PM_{2.5}$ should be reduced by 35% compared to 2018 levels.
Stockton-on-Tees Borough Council (**Ref. 5.9**)	The Stockton-on-Tees Borough Council local plan makes reference to air quality under the following policies: ■ Policy SD5 – Natural, Built and Historic Environment ■ Policy ENV7 – Ground, Air, Water, Noise and Light Pollution
Middlesbrough Council Local Development Framework Core Strategy (**Ref. 5.10**)	The Middlesbrough Council local plan makes reference to air quality under the following policies and objectives: ■ Policy CS4 – Sustainable Development ■ Policy DC1 – General Development ■ Spatial Objective 8 regarding the improvement of connectivity in Middlesborough ■ Spatial Objective 9 regarding sustainable levels of economic growth
Redcar and Cleveland Borough Council (**Ref. 5.11**)	The Redcar and Cleveland Borough Council local plan makes reference to air quality under the following policies: ■ Policy LS 4 – South Tees Spatial Strategy ■ Policy TA 3 – Sustainable Transport Networks

Policy / Legislation / Guidance	Description
Legislation	
The Air Quality (Miscellaneous Amendment and Revocation of Retained Direct EU Legislation) (EU Exit) Regulations 2018 (**Ref. 5.12**)	The Air Quality (Miscellaneous Amendment and Revocation of Retained Direct EU Legislation) (EU Exit) Regulations 2018 ensured the continuity of legislation following the UK exit from the European Union, previous air quality legislation having been driven by the requirements of European Union Directive 2008/50/EC.
The Environmental (Miscellaneous Amendments) (EU Exit) Regulations 2020 (**Ref. 5.13**)	The Environmental (Miscellaneous Amendments) (EU Exit) Regulations 2020 ensured continued compliance with the retained European Union air quality regulations through the introduction of a limit value for $PM_{2.5}$ of 20 µg/m³.
The Air Quality (England) Regulations 2000 - SI 2000 928 (**Ref. 5.14**)	The Air Quality (England) Regulations 2000 set the initial limits for the acceptable concentrations for pollutants in ambient air and the dates by which they must be achieved.
The Air Quality (England) (Amendment) Regulations 2002- SI 2002 3043 (**Ref. 5.15**)	The Air Quality (England) Regulations 2000 were amended by the Air Quality (England) (Amendment) Regulations 2002 by prescribing new air quality objectives for benzene and carbon monoxide.
The Air Quality Standards Regulations 2010 – SI 2010 1001 (**Ref. 5.16**)	The Air Quality Standards Regulations 2010 transcribed into English Law the requirements of Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe. This updated the limits for acceptable concentrations for pollutants in ambient air and set the reporting requirements for member states to the European Commission.
Environment Act 1995 (**Ref. 5.17**)	The Environment Act 1995 requires the UK Government and Devolved Administrations to produce the national Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS) containing standards, objectives and measures for improving air quality, and to keep these policies under review.
Environment Act 2021 (**Ref. 5.18**)	The Environment Act 2021 aims to deliver cleaner air by requiring the government to set targets on air quality and by updating its National Air Quality Strategy. The Act set a legally binding duty on the government to bring forward at least two new air quality targets by 31 October 2022.
Guidance	
Institute of Air Quality Management (IAQM) Land-Use Planning & Development Control: Planning For Air Quality v1.2 (**Ref. 5.19**)	The IAQM Planning Guidance provides guidance for the assessment of air quality in a number of areas. Screening criteria are provided, along with guidance on levels of impact and the assessment of significance specific to air quality. Guidance is provided on the expected content and level of detail in an air quality assessment.

Policy / Legislation / Guidance	Description
IAQM Guidance on the Assessment of Dust from Demolition and Construction v1.1 (**Ref. 5.20**)	The guidance provides a method for the assessment of the risk of dust impacts from activities related to demolition and construction sites. The method is semi-qualitative in that it requires numerical inputs for the number of nearby receptors and local air pollutant concentrations, which are then applied to subjective criteria such as perceived amenity in order to arrive at a level of risk. The assessed risk can then be used to prescribe site specific mitigation measures in order to ensure that the actual risk of dust impacts is reduced to zero.
National Planning Practise Guidance: Air Quality Guidance (**Ref 5.21**)	The UK Government guidance provides information on the position of air quality assessment within the UK planning systems and required content and detail that should be included in an air quality assessment. The guidance is very broad in its approach with more detail being provided by the IAQM (**Ref. 5.19**).
Defra and the Devolved Administrations Local Air Quality Management Technical Guidance (TG22) (LAQM.TG(22)) (**Ref. 5.22**)	The Local Air Quality Management (LAQM).TG(22) document provides the necessary guidance for the treatment of air quality monitoring and modelling. Methodologies are provided for the commissioning and operation of monitoring programmes and the treatment of collected data, along with the use of background concentrations and monitored concentrations in the calibration of modelled pollutant predictions.
Defra and the Environment Agency Air emissions risk assessment for your environmental permit (**Ref. 5.23**)	This guidance produced by the Environment Agency and Defra outlines the steps to be taken for an assessment of air quality relevant to Environmental Assessment Levels and the limits and target values within the Air Quality Standards Regulations. The assessment is aimed specifically at the Environmental Permitting process for industrial installations.
IAQM A Guide to the assessment of air quality impacts on designated nature conservation sites Version 1.1 (**Ref. 5.24**)	The IAQM guidance for air quality impacts on designated nature sites summarises the current methodologies and provides information on a number of pieces of case law regarding deposition of air pollutants to ecologically valuable areas. A suggested assessment process is presented which incorporates the cooperation of both air quality specialists and ecological specialists.
Environment Agency AQTAG06 Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air (**Ref. 5.25**)	The Defra technical guidance contains screening criteria for assessment, and the accepted factors for the conversion of pollutants in ambient air to deposition to the surfaces found in designated nature conservation sites. The guidance is written for the assessment of Habitat sites (formerly Natura2000 sites) however is considered applicable to all nature conservation sites.
Joint Nature Conservation Committee (JNCC) Report No. 665: Nitrogen Futures (**Ref. 5.26**)	The report from the JNCC provides the national projections for concentrations of NH_3 in ambient air and rates of deposition for nutrient nitrogen from ambient air. The report presents a number of potential future scenarios, and as a conservative measure the Business As Usual

Policy / Legislation / Guidance	Description
	(not meeting the National Emissions Ceiling Regulations) scenario is used for projections in this report.
IAQM Guidance on the assessment of odour for planning (**Ref. 5.27**)	The guidance from the IAQM provides a summary on the assessment of odour following a review of available guidance from the relevant authorities and devolved administrations. A summary of odour benchmarks and potential impact descriptors for odour impacts are provided along with a summary of the benefits and shortfalls of various odour monitoring techniques.
Environment Agency H4 Odour Management (**Ref. 5.28**)	The Environment Agency issued guidance note H4 in order to aid compliance with Environmental Permits related to odour emissions. The guidance provides information on the expected content of an odour management plan, and provides guidance on assessment, monitoring techniques and control measures.
Environment Agency Appendix C: summary of toxicological evidence for MEA and NDMA (**Ref. 5.29**)	This appendix provides the details for the derivation of Environmental Assessment levels for Amines following a consultation of the derivation of new Environmental Assessment Levels.
CERC ADMS 6 Amine Chemistry Supplement (**Ref. 5.30**)	ADMS 6 model developers CERC provide guidance on the use of the amine chemistry module for carbon capture and storage.
World Health Organisation Air Quality Guidelines for Europe (**Ref. 5.31**)	Guidelines for pollutant exposure produced by the World Health Organisation (WHO) together with the International Programme on Chemical Safety and the European Commission.

5.2.2. The current limit and objective values for key pollutants from the legislation and policy in **Table 5-1** are shown in **Table 5-2**. The detrimental health effects of poor air quality have been shown to be present at concentrations substantially below these represented in the limit and objective values in **Table 5-2**.

Table 5-2 - Air Pollutant Limit and Objective Values

Pollutant	Objective/Limit Value	Measure as	Date to be achieved by and maintained thereafter		
			AQS	Regulations	2008/50/EC
Nitrogen dioxide (NO_2)	200 µg/m³ Not to be exceeded more than 18 times a year	1-hour mean	31-Dec-05	31-Dec-05	01-Jan-10
	40 µg/m³	Annual mean	31-Dec-05	31-Dec-05	01-Jan-10

Pollutant	Objective/Limit Value	Measure as	Date to be achieved by and maintained thereafter		
			AQS	Regulations	2008/50/EC
Oxides of nitrogen (NO_x)	30 µg/m³ For the protection of vegetation	Annual mean	31-Dec-00	31-Dec-00	19-Jul-01
Particulate matter (PM_{10}), aerodynamic diameter up to 10 µm.	50 µg/m³ Not to be exceeded more than 35 times in a year	24-hour mean	31-Dec-10	11-Jun-10	-
	40 µg/m³	Annual mean	31-Dec-10	11-Jun-10	-
Particulate matter ($PM_{2.5}$), aerodynamic diameter up to 2.5 µm.	20 µg/m³	Annual mean	-	10-Dec-20	-
Sulphur dioxide (SO_2)	266 µg/m³ Not to be exceeded more than 35 times a year	15-minute mean	31-Dec-05		
	350 µg/m³ Not to be exceeded more than 24 times a year	1-hour mean	31-Dec-04	31-Dec-04	01-Jan-05
	125 µg/m³ Not to be exceeded more than 3 times a year	24-hour mean	31-Dec-04	31-Dec-04	01-Jan-05
	20 µg/m³ For the protection of vegetation	Annual and Winter average	31-Dec-00	31-Dec-00	19-Jul-01

5.2.3. **Table 5-3** shows a list of metals and trace elements likely to be present from the Fischer-Tropsch process shown in **Figure 2-3**. when utilised during the conversion of Waste to Sustainable Aviation Fuel (SAF) as is being undertaken with this project **(Ref. 5.32**). The Environmental Assessment Limits for those metals and trace

elements prescribed by the Environment Agency **(Ref. 5.23**) are also shown in **Table 5-3**.

Table 5-3 - Environmental Assessment Limits for Metals and Trace Elements

Trace Element	Defined by	Environmental Assessment Limit	Averaging Period
Lead (Pb)	Objective Value (**Ref. 5.6**)	0.25 µg/m³	Annual mean
	Limit Value (**Ref. 5.16**)	0.5 µg/m³	Annual mean
Arsenic (As)	Target Value (**Ref. 5.16**)	6 ng/m³	Running annual mean
Cadmium (Cd)	Target Value (**Ref. 5.16**)	5 ng/m³	Annual mean
Nickel (Ni)	Target Value (**Ref. 5.16**)	20 ng/m³	Annual mean
Chromium (Cr)	EAL (**Ref. 5.23**)	150 µg/m³	1-hour mean
	EAL (**Ref. 5.23**)	5 µg/m³	Annual mean
Copper (Cu)	EAL (**Ref. 5.23**)	200 µg/m³	1-hour mean
	EAL (**Ref. 5.23**)	10 µg/m³	Annual mean
Zinc (Zn) (as zinc oxide (ZnO_2)	EAL (**Ref. 5.23**)	1,000 µg/m³	1-hour mean
	EAL (**Ref. 5.23**)	50 µg/m³	Annual mean
Selenium (Sn)	EAL (**Ref. 5.23**)	30 µg/m³	1-hour mean
	EAL (**Ref. 5.23**)	1 µg/m³	Annual mean
Manganese (Mn)	EAL (**Ref. 5.23**)	1,500 µg/m³	1-hour mean

Trace Element	Defined by	Environmental Assessment Limit	Averaging Period
	EAL (**Ref. 5.23**)	0.15 µg/m³	Annual mean
Naphthalene	EAL (**Ref. 5.23**)	3 µg/m³	24-hour mean
Bromine (Br)	EAL (**Ref. 5.23**)	70 µg/m³	1-hour mean
Chlorine (Cl)	EAL (**Ref. 5.23**)	290 µg/m³	1-hour mean
Antimony (Sb)	EAL (**Ref. 5.23**)	150 µg/m³	1-hour mean
	EAL (**Ref. 5.23**)	5 µg/m³	Annual mean
Acetaldehyde	EAL (**Ref. 5.23**)	9,200	1-hour mean
	EAL (**Ref. 5.23**)	370	Annual mean
Formaldehyde	EAL (**Ref. 5.23**) (**Ref. 5.31**)	100	30-minute mean
	EAL (**Ref. 5.23**)	5	Annual mean

5.2.4. The EALs for amines, amine derivatives and aldehydes expected to be part of the carbon capture process were established by the Environment Agency following a review of the toxicological evidence and a public consultation on the derivation of new Environmental Assessment Levels (**Ref. 5.29**). These are shown in **Table 5-4**.

Table 5-4 - Amine Environmental Assessment Limits

Trace Element	Defined by	Environmental Assessment Limit	Averaging Period
Monoethanolamine (MEA)	EAL (**Ref. 5.44**)	200 µg/m³	1-hour mean
	EAL (**Ref. 5.44**)	100 µg/nm³	24-hour mean
Nitrosodimethyl-amine (NDMA)	EAL (**Ref. 5.44**)	0.2 ng/m³	Annual mean

Trace Element	Defined by	Environmental Assessment Limit	Averaging Period
Acetaldehyde	EAL (**Ref. 5.23**)	9,200	1-hour mean
	EAL (**Ref. 5.23**)	370	Annual mean
Formaldehyde	EAL (**Ref. 5.31**)	100	30-minute mean
	EAL (**Ref. 5.23**)	5	Annual mean

5.3. STUDY AREA

CONSTRUCTION STAGE

5.3.1. During the construction stage the study area for the assessment of impacts is defined by the criteria in the IAQM Guidance on the Assessment of Dust from Demolition and Construction (**Ref. 5.20**). An assessment of the risk of dust impacts is required where there is:

- A human receptor within 350 m of the construction site boundary or within 50 m of the routes used by construction traffic on the public highway up to 500 m from the site entrance; or
- An ecological receptor within 50 m of the construction site boundary or within 50 m of the routes used by construction traffic on the public highway up to 500 m from the site entrance.

OPERATIONAL STAGE

Human Receptors

5.3.2. For the assessment of operational impacts there is no specific guidance on the required study area for the assessment of impacts on human receptors, therefore a proportionate approach is applied using professional judgement, which may vary in subsequent stages of assessment. For the scoping assessment a distance of 2 km from the site boundary is used on the basis that significant impacts from fossil fuel combustion emissions typically do not occur beyond this distance unless the source is a large combustion plant such as the CCGT in the power island. Given the dispersion of amines may occur over a larger area and the presence of the CCGT a receptor grid out to 10 km will be used in order to establish where the limits to impacts may lie, whilst specified receptors within 2 km will be used for discrete predictions.

5.3.3. Due to the presence of the amine-based carbon capture operation and the uncertainty over the impacts of this process on ambient air quality, the size of the study area for operational impacts is open to redefinition at subsequent design stages.

5.3.4. The Drax Bioenergy with Carbon Capture and Storage Project Development Consent Order application (PINS reference EN1012) is one of the first Nationally Significant

Infrastructure Projects in the United Kingdom in which detailed, complex atmospheric dispersion modelling of air emissions from carbon capture and storage has been completed and is currently under examination by the Examining Authority (**Ref. 5.33**). It is proposed to apply the same impact assessment methodology at an appropriate scale for this development. Assessment of the Drax Bioenergy with Carbon Capture and Storage Project showed that impacts on concentrations of amines were shown to occur up to 15 km from the emission point. Therefore, for subsequent stages, a coarse receptor grid up to a distance of 15 km in every direction may be required in order to determine the extent of changes in the concentrations of some air pollutants. This will be dependent on the carbon capture equipment design once finalised.

Ecological Receptors

5.3.5. For the assessment of operational impacts on ecological receptors, a conservative study area of 15 km from the site boundary is applied according to the guidance provided in AQTAG06 (**Ref. 5.25**) and the Environment Agency (**Ref. 5.23**) for large combustion plant.

5.4. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

Local Air Quality Management

5.4.1. The Proposed Scheme is located within the local authority area of Stockton-on-Tees adjacent to the borders of Middlesborough Borough Council and Redcar and Cleveland Borough Council.

5.4.2. The baseline monitoring datasets in this section have been sourced from the 2019 monitoring reported in the 2020 Annual Status Reports (ASR). Monitoring completed in 2019 provides the last complete dataset without the influence of social restrictions caused by the Covid-19 pandemic. The inclusion of the 2020 and 2021 data would necessarily skew any trends towards air quality improvements due to reduced levels of public movement and by extension reduced vehicles on the roads and permitted installation activities in Stockton-on-Tees. As a result, 2020 and 2021 data are discussed but not presented. When approved by Defra, monitoring completed in 2022, which will be published in the 2023 ASRs, will provide the first full year of monitoring completed without the influence of the Covid-19 pandemic.

5.4.3. The following local authorities are also present within the 15km study area but not adjacent to the Proposed Scheme:

- County Durham;
- Darlington;
- Hambleton District (North Yorkshire County);
- Hartlepool; and
- Scarborough District (North Yorkshire County).

5.4.4. Due to the distance or location of these local authorities, no significant effects are expected within these areas. Should detailed analysis at subsequent stages of the environmental assessment process show that effects upon local air quality in these areas is possible, then a more detailed analysis will be presented.

Stockton-on-Tees

5.4.5. Local Air Quality Management (LAQM) information has been taken from the 2020 and 2022 Air Quality ASRs.

5.4.6. The 2022 ASR (**Ref. 5.34**) identifies the principal source of air pollution in the area as emissions from vehicle traffic. It also notes that there are 42 businesses within the borough regulated by the Environment Agency and 62 businesses regulated by the local authority under the Environmental Permitting Regulations. All are permitted to emit to air. The 2020 ASR (**Ref. 5.35**) indicates that prior to the Covid-19 lockdowns air quality in the borough was already exhibiting a sustained trend for improvement.

5.4.7. Monitoring is undertaken through the use of automatic monitors at three sites, and passive diffusion tubes at 12 sites. All of the monitoring undertaken is considered too remote to be representative of local air quality at the Proposed Scheme location. All sites but one recorded a concentration of NO2 under the objective value of 40 µg/m³ in 2019. The single exceedance was at Yarm Road adjacent to the A66 trunk road where a concentration of 40.4 µg/m³ was recorded, however this location is approximately 9 km from the Proposed Scheme so cannot be considered representative of local air quality at the Proposed Scheme location.

5.4.8. There is no Stockton-on-Tees air quality monitoring within the operational impacts 2km study area for the Proposed Scheme.

5.4.9. There are currently no Air Quality Management Areas (AQMAs) declared for Stockton-on-Tees.

Middlesborough

5.4.10. The 2022 ASR for Middlesborough (**Ref. 5.36**) notes that air quality in the borough has been steadily improving since recording began, however the years 2020 and 2021 are included in the analysis which skews the results. Data from the automatic monitoring undertaken in the borough reported in the 2020 ASR (**Ref. 5.37**) shows a sustained improvement in concentrations of NO_2 to 2019. However, concentrations of particulate matter in both the PM_{10} and $PM_{2.5}$ fractions appear stable.

5.4.11. Middlesborough currently undertakes monitoring at two continuous, automatic sites and at 22 sites for passive diffusion tubes. All of the monitoring undertaken in Middlesborough is too remote from the Proposed Scheme to be considered representative of conditions at the site of the Proposed Scheme.

5.4.12. Monitoring locations within the operational impacts 2 km study area for the Proposed Scheme are shown in **Table 5-5** with monitoring results from the 2020 ASR (**Ref.**

5.37). A Sens Slope statistic[1] has been used in order to establish trends in the monitoring data however the use of only five (or less) data points is not enough to determine the statistical significance of a trend. A negative Sens Slope statistic indicates an overall improvement in air quality over the period of monitoring, and a positive statistic indicates an overall deterioration in air quality.

Table 5-5 - Middlesborough NO2 Monitoring Locations

Location ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO2 Concentration (µg/m³)					Sens Slope (µg/m
			2015	2016	2017	2018	2019	
BH	450506	519620	15.7	18.1	13.1	14.5	16.1	-0.150
M2	451059	520133	17.9	22.5	18.5	20.8	18.0	-0.113
M3	451306	519425	26.6	27.8	28.1	29.4	26.1	0.525
M15	450044	519926	19.8	23.4	20.9	24.3	20.4	0.300
M16	449451	520632	33.2	35.4	35.9	30.1	30.5	-0.854
M17	449565	520220	24.3	26.2	22.7	26.3	22.4	-0.313
M18	449161	520411	-	35.9	32.5	33.2	31.3	-1.442
M20	450506	519620	16.3	17.8	17.0	20.8	19.9	1.175
M21	450506	519620	15.5	18.1	16.5	20.7	19.8	1.188
M22	450506	519620	17.7	18.0	17.7	21.0	19.5	0.475
M23	449451	520632	-	-	40.7	31.0	30.9	-4.900

5.4.14. The data in **Table 5-5** shows an even mix of diffusion tube locations where air quality is improving over the 5-year period to 2019 and locations where air quality is deteriorating up to 2019. This is in contrast to the information in the 2022 ASR (**Ref. 5.36**) which shows an improvement due to the inclusion of data collected during the Covid-19 pandemic.

5.4.15. There are currently no AQMAs declared for Middlesborough.

Redcar and Cleveland

5.4.16. The 2022 ASR (**Ref. 5.38**) for Redcar and Cleveland states that air quality in the borough is considered to be good and in compliance with the UK objectives, and that

[1] A method for estimating the slope of a regression line that fits a set of (x, y) data elements based on a least-squares estimate.

the local authority is in the process of procuring a continuous $PM_{2.5}$ analyser. The 2020 ASR (**Ref. 5.36**) notes that air quality was improving up to publication, which represents a trend for improvement prior to the Covid19 lockdowns.

5.4.17. Up to 2021, Redcar and Cleveland undertook monitoring at a single continuous automatic site and at 16 passive diffusion tube locations, all of which are too remote from the Proposed Scheme to be considered representative.

5.4.18. Monitoring locations within the operational impacts 2 km study area for the Proposed Scheme are shown in **Table 5-6** with results from the 2020 ASR (**Ref. 5.39**).

Table 5-6 - Redcar and Cleveland NO2 Monitoring Locations

Location ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO2 Concentration (µg/m³)					Sens Slope (µg/m³)
			2015	2016	2017	2018	2019	
R26	453142	520836	21.9	20.5	19.8	24.7	19.5	-0.467
R46	452644	520921	-	-	-	-	16.1	-

5.4.19. The monitoring data shown in **Table 5-6** shows a sustained improvement in NO_2 pollution for the single location (R26) for which more than one year of data was available as indicated by the negative Sens Slope statistic.

5.4.20. There are currently no AQMAs declared for Redcar and Cleveland.

Hartlepool

5.4.21. The 2022 ASR (**Ref. 5.40**) states that air quality in the borough is generally considered to be good in areas where the public are regularly exposed on the basis that monitored concentrations of air pollutants are below the UK objective values. Whilst the ASR states that there is currently no published objective for PM2.5, at the time of publication at limit value of 20 µg/m³ had received parliamentary approval (**Ref. 5.11**). The two automatic monitors operated by the local authority monitor PM10 and a conversion factor is applied to derive PM2.5 concentrations. The Stockton Road monitor has a concentration of 18.9 µg/m³ in 2019 (95% of the limit value) and the Headland monitor a concentration of 22.2 µg/m³ in 2019 (110% of the limit value). The 2022 ASR records reductions in 2020 and 2021 however these results are considered to be affected by the Covid-19 pandemic restrictions.

5.4.22. Concentrations of both NO2 and PM10 recorded in 2019 are both substantially below the limit value of 40 µg/m³ common to both pollutants.

Background Air Quality

5.4.23. Background concentrations of air pollutants have been obtained from Defra Background Mapping archive for 2023 from the base year of 2018 (**Ref. 5.41**).

5.4.24. Annual average background concentrations of NO_2 within the operational impacts 2 km study area for the Proposed Scheme location, shown in **Figure 5-1**, range from 11.1 µg/m³ to 27.1 µg/m³, which is between 28% and 68% of the limit and objective value of 40 µg/m³ for the protection of human health.

5.4.25. For NO_X in **Figure 5-3**, the annual average background concentrations range between 14.9 µg/m³ and 44.8 µg/m³, which is 50% and 150% of the limit value of 30 µg/m³ for the protection of vegetation.

5.4.26. Annual average background concentrations of PM_{10}, shown in **Figure 5-5**, range between 9.4 µg/m³ and 13.7 µg/m³, which is a range of between 24% and 34% of the limit and objective value of 40 µg/m³ for the protection of human health.

5.4.27. The annual average background concentrations of $PM_{2.5}$, shown in **Figure 5-7**, range from 6.3 µg/m³ to 8.8 µg/m³, which is 31% and 44% of the limit value of 20 µg/m³ for the protection of human health respectively.

5.4.28. Background concentrations of NH_3, SO_2 and rates of nutrient nitrogen deposition within the 15 km study area for effects on designated nature conservation sites have been obtained from the Air Pollution Information System datasets maintained by the Centre for Ecology and Hydrology (**Ref. 5.42**). The values are a 3-year average for the period 2019-2021 inclusive.

5.4.29. Background concentrations of NH_3, shown in **Figure 5-9**, range between 1.4 µg/m³ and 2.3 µg/m³. All values are less than the Critical Level (CLe) of 3 µg/m³ for the protection of higher plants, however, all are in excess of the CLe of 1 µg/m³ for the protection of lichens and bryophytes.

5.4.30. Background rates of nutrient nitrogen deposition, shown in **Figure 5-10**, range from 12.15 kg N/ha/yr to 29.90 kg N/ha/yr. The effect that such rates are having on the local environment will be dependent on the specific sensitivity of the receiving habitats defined by unique Upper and Lower Critical Loads (UCLo and LCLo) for that habitat.

5.4.31. Rates of background acid deposition range between 0.96 keq/ha/yr and 2.50 keq/ha/yr within the 15 km study area. As with nutrient nitrogen deposition, the effects of acid deposition are dependent on the sensitivity of the receiving habitat along with local concentrations of both nitrogen and sulphur compounds. Background annual average concentrations of SO_2 range between 0.6 µg/m³ and 5.1 µg/m³ within the study area so are substantially below the 20 µg/m³ limit for the protection of vegetation and are considered to be low.

5.4.32. Current background air quality is considered to be good in that all the values measured against limits and objectives for the protection of human health are below those limits and objectives.

5.4.33. In relation to designated nature conservation sites, concentrations of NO_X are in excess of the limit for the protection of vegetation and the upper range of rates of

nutrient nitrogen deposition are higher than the maximum UCLo described for habitats in the study area on the APIS website. Concentrations of ammonia are below the 3 µg/m³ limit for the protection of higher plants, however it is not confirmed at this stage whether any of the sites within the Study Area may have lichens or bryophytes present where the limit would be 1 µg/m³.

Future Baseline

Background Air Quality

5.4.34. Background concentrations of air pollutants have been obtained from Defra Background Mapping archive for the expected 2028 Proposed Scheme opening year from the base year of 2018 (**Ref. 5.41**).

5.4.35. Annual average background concentrations of NO_2 within operational impacts 2 km study area for the Proposed Scheme location, as shown in **Figure 5-2**, range between 10.1 µg/m³ and 26.3 µg/m³, which is between 25% and 66% of the limit and objective value of 40 µg/m³ for the protection of human health.

5.4.36. For NO_X, the annual average background concentrations range from 13.4 µg/m³ to 42.9 µg/m³, as shown in **Figure 5-4**, which is 45% and 143% of the limit value of 30 µg/m³ for the protection of vegetation.

5.4.37. Annual average background concentrations of PM_{10} shown in **Figure 5-6** range from 9.1µg/m³ to 13.4 µg/m³, which is a range of between 23% and 34% of the limit and objective value of 40 µg/m³ for the protection of human health and is little changed from 2023.

5.4.38. The annual average background concentrations of $PM_{2.5}$ shown in **Figure 5-8** range from 6.1 µg/m³ and 8.6 µg/m³ and is little changed from 2023. However, the 2028 interim limit of 12 µg/m³ for $PM_{2.5}$ will apply, making the concentrations between 51% and 72% of the limit value for the protection of human health.

5.4.39. The future baseline for background concentrations of NH_3 and rates of nutrient nitrogen deposition is based upon the 2019-21(**Ref. 5.42**) with the application of factors from the JNCC Nitrogen Futures report (**Ref. 5.26**) to provide the values for the expected Proposed Scheme opening year 2028.

5.4.40. Background concentrations of NH_3 range from 1.40 µg/m³ to 2.35 µg/m³ which is a slight increase compared to 2023 in line with the JNCC Nitrogen Futures predictions (**Ref. 5.23**).

5.4.41. Background rates of nutrient nitrogen deposition range from 11.01 kg N/ha/yr to 27.05 kg N/ha/yr representing a slight reduction compared to 2023.

Proposed Baseline Monitoring

5.4.42. Air quality monitoring will be completed for the purpose of characterising localised background and baseline conditions. The pollutants to be monitored and locations of

monitoring equipment will be agreed in consultation with the relevant council Environmental Health Officer(s) and Natural England.

Human Health and Amenity Impacts

5.4.43. To collect the datasets required to assess human health impacts, monitoring will cover key pollutants, ambient NO_x and fine particulate matter. We also propose localised monitoring of rates of dust deposition at specific sensitive locations for the purpose of assessing amenity impacts due to dust deposition.

Ecological Impacts

5.4.44. For the purpose of assessing the impact of the deposition of combustion pollutants, NO_x and SO_x will be monitored. We also propose to monitor ammonia (NH_3) because this is a constituent of overall nitrogen deposition and is the compound from which the amines used in carbon capture are derived.

N

0 2 4 6 8 kilometers

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DO NOT SCALE

Information Classification:

PUBLIC

Information that is available to the general public and is intended for distribution outside WSP

Legend

- Proposed DCO Application Boundary
- Proposed DCO Application Boundary 2 km Study Area
- Proposed DCO Application Boundary 10 km Study Area
- Proposed DCO Application Boundary 15 km Study Area

Background 2023 NO_2 Concentrations (µg/m³)

- 4.0 - 8.0
- 8.0 - 12.0
- 12.0 - 16.0
- 16.0 - 20.0
- 20.0 - 24.0
- 24.0 - 28.0

NO_2 Automatic Monitoring (µg/m³)

- 8.0 - 12.0
- 12.0 - 16.0
- 16.0 - 20.0
- 20.0 - 24.0

NO_2 Diffusion Tubes (µg/m³)

- 8.0 - 12.0
- 12.0 - 16.0
- 16.0 - 20.0
- 20.0 - 24.0
- 24.0 - 28.0
- 28.0 - 32.0
- 32.0 - 36.0
- 40.0 - 44.0
- 52.0 - 56.0

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

CLIENT: Lighthouse Green Fuels Ltd

PROJECT: Lighthouse Green Fuels

TITLE: Figure 5.1 - Air Quality Scoping Assessment Background 2023 NO_2 Concentrations

SCALE @ A1:	CHECKED:	APPROVED:
1:70,000	UKSMB004	UKAVR002

PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442	UKLFS001	UKLFS001	19/07/2023

DRAWING No: 70102442-WSP-RP-ES-0501 REV: 2

N

0 2 4 6 8 kilometers

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DO NOT SCALE

Information Classification:

PUBLIC

Information that is available to the general public and is intended for distribution outside WSP

Legend

- Proposed DCO Application Boundary
- Proposed DCO Application Boundary 2 km Study Area
- Proposed DCO Application Boundary 10 km Study Area
- Proposed DCO Application Boundary 15 km Study Area

Background 2028 NO_2 Concentrations (µg/m³)

- 0.0 - 4.0
- 4.0 - 8.0
- 8.0 - 12.0
- 12.0 - 16.0
- 16.0 - 20.0
- 20.0 - 24.0
- 24.0 - 28.0

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

CLIENT: Lighthouse Green Fuels Ltd

PROJECT: Lighthouse Green Fuels

TITLE: Figure 5.2Air Quality Scoping Assessment Background 2028 NO_2 Concentrations

SCALE @ A1:	CHECKED:		APPROVED:
1:70,000	UKSMB004		UKAVR002
PROJECT No: 70102442	DESIGNED: UKLFS001	DRAWN: UKLFS001	DATE: 19/07/2023

DRAWING No: 70102442-WSP-RP-ES-0502 REV: 2

DO NOT SCALE

Information Classification:

PUBLIC

Information that is available to the general public and is intended for distribution outside WSP

Legend

- Proposed DCO Application Boundary
- Proposed DCO Application Boundary 15 km Study Area
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)
- Ancient Woodland Inventory (AWI)
- Local Nature Reserves (LNR)

Background 2023 NOx Concentrations (µg/m³)

- 3.0 - 6.0
- 6.0 - 9.0
- 9.0 - 12.0
- 12.0 - 15.0
- 15.0 - 18.0
- 18.0 - 21.0
- 21.0 - 24.0
- 24.0 - 27.0
- 27.0 - 30.0
- 30.0 - 33.0
- 33.0 - 36.0
- 42.0 - 45.0

N

0 2 4 6 8 kilometers

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

CLIENT: Lighthouse Green Fuels Ltd

PROJECT: Lighthouse Green Fuels

TITLE: Figure 5.3- Air Quality Scoping Assessment Background 2023 NOx Concentrations

SCALE @ A1:	CHECKED:	APPROVED:
1:70,000	UKSMB004	UKAVR002

PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442	UKLFS001	UKLFS001	19/07/2023

DRAWING No: 70102442-WSP-RP-ES-0503 REV: 2

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N

0 2 4 6 8 kilometers

DO NOT SCALE

Information Classification:

PUBLIC

Information that is available to the general public and is intended for distribution outside WSP

Legend

- Proposed DCO Application Boundary
- Proposed DCO Application Boundary 15 km Study Area
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)
- Ancient Woodland Inventory (AWI)
- Local Nature Reserves (LNR)

Background 2028 NOx Concentrations (µg/m³)

- 3.0 - 6.0
- 6.0 - 9.0
- 9.0 - 12.0
- 12.0 - 15.0
- 15.0 - 18.0
- 18.0 - 21.0
- 21.0 - 24.0
- 24.0 - 27.0
- 27.0 - 30.0
- 30.0 - 33.0
- 39.0 - 42.0
- 42.0 - 45.0

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

CLIENT: Lighthouse Green Fuels Ltd

PROJECT: Lighthouse Green Fuels

TITLE: Figure 5.4 - Air Quality Scoping Assessment Background 2028 NOx Concentrations

SCALE @ A1:	CHECKED:	APPROVED:
1:70,000	UKSMB004	UKAVR002

PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442	UKLFS001	UKLFS001	19/07/2023

DRAWING No: 70102442-WSP-RP-ES-0504 REV: 2

N

0 2 4 6 8 kilometers

Created by: UKLFS001 - 2023-07-19 07:51:23 - C:\Work\70102442 - Lighthouse Green Fuels EIA\06 GIS\01 Live Drgs\qgs\Initial.qgs

DO NOT SCALE

Information Classification:

PUBLIC

Information that is available to the general public and is intended for distribution outside WSP

Legend

- Proposed DCO Application Boundary
- Proposed DCO Application Boundary 2 km Study Area
- Proposed DCO Application Boundary 10 km Study Area
- Proposed DCO Application Boundary 15 km Study Area

Background 2023 PM_{10} Concentrations (µg/m³)

- 8.0 - 12.0
- 12.0 - 16.0

PM_{10} Automatic Monitoring (µg/m³)

- 12.0 - 16.0
- 16.0 - 20.0
- 24.0 - 28.0
- 28.0 - 32.0

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

CLIENT: Lighthouse Green Fuels Ltd

PROJECT: Lighthouse Green Fuels

TITLE: Figure 5.5 - Air Quality Scoping Assessment Background 2023 PM_{10} Concentrations

SCALE @ A1:	CHECKED:	APPROVED:
1:70,000	UKSMB004	UKAVR002

PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442	UKLFS001	UKLFS001	19/07/2023

DRAWING No: 70102442-WSP-RP-ES-0505 REV: 2

N

0 2 4 6 8 kilometers

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DO NOT SCALE

Information Classification:

PUBLIC

Information that is available to the general public and is intended for distribution outside WSP

Legend

- Proposed DCO Application Boundary
- Proposed DCO Application Boundary 2 km Study Area
- Proposed DCO Application Boundary 10 km Study Area
- Proposed DCO Application Boundary 15 km Study Area

Background 2028 PM_{10} Concentrations (µg/m³)

- 8.0 - 12.0
- 12.0 - 16.0

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

CLIENT: Lighthouse Green Fuels Ltd

PROJECT: Lighthouse Green Fuels

TITLE: Figure 5.6 - Air Quality Scoping Assessment Background 2028 PM_{10} Concentrations

SCALE @ A1:	CHECKED:	APPROVED:
1:70,000	UKSMB004	UKAVR002

PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442	UKLFS001	UKLFS001	19/07/2023

DRAWING No: 70102442-WSP-RP-ES-0506

REV: 2

N

0 2 4 6 8 kilometers

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DO NOT SCALE

Information Classification:

PUBLIC

Information that is available to the general public and is intended for distribution outside WSP

Legend

- Proposed DCO Application Boundary
- Proposed DCO Application Boundary 2 km Study Area
- Proposed DCO Application Boundary 10 km Study Area
- Proposed DCO Application Boundary 15 km Study Area

Background 2023 $PM_{2.5}$ Concentrations (µg/m³)

- 4.0 - 6.0
- 6.0 - 8.0
- 8.0 - 10.0

$PM_{2.5}$ Automatic Monitoring (µg/m³)

- 16.0 - 20.0
- 20.0 - 24.0
- 36.0 - 40.0
- 44.0 - 48.0

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

CLIENT: Lighthouse Green Fuels Ltd

PROJECT: Lighthouse Green Fuels

TITLE: Figure 5.7 - Air Quality Scoping Assessment Background 2023 $PM_{2.5}$ Concentrations

SCALE @ A1:	CHECKED:	APPROVED:
1:70,000	UKSMB004	UKAVR002

PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442	UKLFS001	UKLFS001	19/07/2023

DRAWING No:	REV:
70102442-WSP-RP-ES-0507	2

N

0 2 4 6 8 kilometers

DO NOT SCALE

Information Classification:

PUBLIC

Information that is available to the general public and is intended for distribution outside WSP

Legend

- Proposed DCO Application Boundary
- Proposed DCO Application Boundary 2 km Study Area
- Proposed DCO Application Boundary 10 km Study Area
- Proposed DCO Application Boundary 15 km Study Areaa

Background 2028 $PM_{2.5}$ Concentrations (µg/m³)

- 4.8 - 6.0
- 6.0 - 7.2
- 7.2 - 8.4
- 8.4 - 9.6

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

CLIENT: Lighthouse Green Fuels Ltd

PROJECT: Lighthouse Green Fuels

TITLE: Figure 5.8 - Air Quality Scoping Assessment Background 2028 $PM_{2.5}$ Concentrations

SCALE @ A1:	CHECKED:	APPROVED:
1:70,000	UKSMB004	UKAVR002

PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442	UKLFS001	UKLFS001	19/07/2023

DRAWING No: 70102442-WSP-RP-ES-0508 REV: 2

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N

0 2 4 6 8 kilometers

DO NOT SCALE

Information Classification:

PUBLIC

Information that is available to the general public and is intended for distribution outside WSP

Legend

- Proposed DCO Application Boundary
- Proposed DCO Application Boundary15 km Study Area
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)
- Ancient Woodland Inventory (AWI)
- Local Nature Reserves (LNR)

Background 2019-2021 NH_3 Concentrations ($\mu g/m^3$)

- 1 - 2
- 2 - 3
- 3 - 4

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

CLIENT: Lighthouse Green Fuels Ltd

PROJECT: Lighthouse Green Fuels

TITLE: Figure 5.9 - Air Quality Scoping Assessment Background 2019-2021 NH_3 Concentrations

SCALE @ A1:	CHECKED:		APPROVED:
1:70,000	UKSMB004		UKAVR002
PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442	UKLFS001	UKLFS001	19/07/2023

DRAWING No: 70102442-WSP-RP-ES-0509 REV: 2

N

0 2 4 6 8 kilometers

DO NOT SCALE

Information Classification:
PUBLIC
Information that is available to the general public and is intended for distribution outside WSP

Legend

- Proposed DCO Application Boundary
- Proposed DCO Application Boundary 15 km Study Area
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)
- Ancient Woodland Inventory (AWI)
- Local Nature Reserves (LNR)

Background 2019-2021 Rates of Nutrient Nitrogen Deposition (kh N/ha/yr)

- 7.0 - 14.0
- 14.0 - 21.0
- 21.0 - 28.0
- 28.0 - 35.0

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels
1 Cornhill, London, England, EC3V 3NR

CLIENT: Lighthouse Green Fuels Ltd

PROJECT: Lighthouse Green Fuels

TITLE: Figure 5.10 - Air Quality Scoping Assessment
Background 2019-2021 Rates of Nutrient Nitrogen Deposition

SCALE @ A1:	CHECKED:	APPROVED:
1:70,000	UKSMB004	UKAVR002

PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442	UKLFS001	UKLFS001	19/07/2023

DRAWING No: 70102442-WSP-RP-ES-0510 REV: 2

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5.5. SENSITIVE RECEPTORS

HUMAN RECEPTORS

5.5.1. The location of human receptors has been determined using open online mapping (**Ref. 5.43**) at locations where the relevant air quality objective and limit values would apply.

5.5.2. The following locations have been identified as areas where people might be present for a period of time commensurate with the limit and objective values for air pollutants within a 2 km radius:

- Residential areas within 2km, including:
  - Port Clarence (approximately 50m)
  - Middlehaven (approximately 500m)
  - Middlesbrough (approximately 900m)
  - North Ormesby (approximately 1,200m)
  - South Bank (approximately 2,300m)
  - Southfield (approximately 1,700m)
  - Gresham (approximately 1,800m)
- Educational facilities within 2 km, including:
  - High Clarence Primary School (approximately 170m)
  - Middlesbrough College (approximately 500m)
  - ESPA College (approximately 320m)
  - North Ormesby Primary Academy (approximately 1,100m)
  - Great Expectations Pre-School (approximately 1,300m)
  - St Alphonsus R C Primary School (approximately 1,400m)
  - Breckon Hill Primary School (approximately 1,500m)
  - Abingdon Primary School (approximately 1,500m)
  - Teesside University (approximately 1,600m)
- Medical Facilities within 2km, including:
  - The Bridge Elysium Healthcare (approximately 500m)
  - Cleveland Health Centre (approximately 1,100m)
  - North Ormesby Health Village (approximately 1,200m)
  - Haven Medical Practice (approximately 1,400m)
  - Newlands Medical Centre (approximately 1,400m)
  - Borough Road & Nunthorpe Medical Group (approximately 1,400m)
  - Park Surgery (approximately 1,700m)

5.5.3. The locations presented above are a non-exhaustive list which may be modified as the project design evolves.

5.5.4. There are no AQMA within the 2 km study area for specified receptors, and none within the further 10 km study area for gridded receptors.

ECOLOGICAL RECEPTORS

5.5.5. Relevant ecological receptors identified within the 15 km study area have been determined from Natural England Datasets (**Ref. 5.44**). These include:

- Teesmouth and Cleveland Coast SPA, SSSI which is directly adjacent to the Proposed Scheme
- North York Moors Special Protection Area (SPA), Special Area of Conservation (SAC), Site of Special Scientific Interest (SSSI) 11.1 km from the Proposed Scheme
- Northumbria Coast SPA 14.1 km from the Proposed Scheme
- Durham Coast SAC, SSSI 14.1 km from the Proposed Scheme

5.5.6. Within the 15 km study area there are a further eight SSSI sites, 119 sites within the Ancient Woodland Inventory (AWI), and 45 Local Nature Reserves (LNR), details of which can be found in **Appendix 5-A**.

5.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION PHASE

5.6.1. The construction dust risk assessment will follow the IAQM guidance (**Ref. 5.18**) which assumes an unmitigated scenario for the construction programme. The level of risk derived in the unmitigated scenario is then used to assign project, process or location specific mitigation measures according to the risk of dust impacts. Typical mitigation measures include but are not limited to:

- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation;
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site;
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas;
- Ensure all on-road vehicles comply with the requirements of the latest relevant non-road mobile machinery standards;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period;
- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;

- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- Develop and implement a Dust Management Plan, which may include measures to control other emissions, approved by the Local Authority; and
- Carry out regular site inspections to monitor compliance with the DMP.

OPERATION PHASE

5.6.2. An initial list of the expected mitigation measures likely to be in place during the operational phase of the SAF production and energy generation processes is provided in the bullet points below. Adherence to the conditions of the environmental permit will also ensure that mitigation functions correctly though stipulated conditions for the operation of the plant. The pollutants anticipated to be controlled by the permit include those in **Table 5-2**, **Table 5-3** and **Table 5-4**, however the final controls will be defined by the Environment Agency upon determination of the environmental permit.

5.6.3. The following emission reduction techniques will be employed:

- Optimisation of stack height and emission velocity;
- Primary and secondary syngas clean-up involving filtration, substantial scrubbing, guard-beds and polishing to remove impurities from the syngas prior to utilisation in the Fischer Tropsch synthesis stage;
- Selective Catalytic Reduction (SCR) for NOx abatement from combustion gases e.g. from the CCGT power plant;
- The carbon capture unit is expected to incorporate amine regeneration to reduce amine emissions; and
- Caustic scrubbing will be utilised post the thermal oxidiser to control emissions of SO_2.

5.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

5.7.1. The construction of the facility is likely to result in the following impacts:

- Nuisance dust deposition at nearby designated nature conservation sites and residential receptors;
- Changes in local concentrations of NO_X, NO_2 and particulate matter as a result of the operation of:
    - construction vehicles on the public highway
    - employee travel to and from the Proposed Scheme location
- Changes in local concentrations of NO_X, NO_2, SOx and particulate matter as a result of the flows of marine construction traffic on the River Tees.

OPERATION PHASE

5.7.2. Operational impacts are likely to be in the form of changes in the local concentrations of air pollutants. These might include:

- Changes in concentrations of NO_X, NO_2, particulate matter, trace elements and heavy metals as a result of industrial emissions from the SAF production and energy generation process and other associated support processes at the Proposed Scheme;
- Potential emissions of volatile organic compounds (VOC), hydrochlorofluorocarbons (HCFC), chlorofluorocarbons (CFC), hydrofluorocarbons (HFC), chlorinated solvents or NH_3 from operation and maintenance of the air separation unit;
- Emissions of amines and formation of degradation products as a result of the operation of the Carbon Capture process at the Proposed Scheme;
- Emission of VOCs and naphthalene due to evaporation from SAF and naphtha storage;
- Changes in concentrations of NO_X, NO_2, SO_x and particulate matter as a result of:
    - marine and rail transportation processes associated with the Proposed Scheme;
    - employee transport to and from the location of the Proposed Scheme; and
    - handling and storage of bulk materials.

5.7.3. Each of these changes may affect both human receptors in terms of changes in concentrations relevant to the limit and objective values in place for the protection of human health, and changes in the ambient concentrations of pollutants and rates of pollutant and nutrient deposition in place for the protection of vegetation.

5.7.4. With reference to **Figure 2-3** and **Table 2-1** from **Chapter 2: Site and Proposed Scheme Description**, the potential emission sources from each stage of the SAF process are listed in **Table 5-7**. Details of emission sources from the non-SAF process components of the Proposed Scheme are shown in **Table 5-8**.

Table 5-7 - Likely Significant Effects per Components of the SAF Plant

Identifier	Component	Description	Plus "Associated Equipment (AE)" (m) e.g. Columns/Stacks	Emissions Source
1	Gasification	This "island" consists of four "gasifier trains" which gasify the waste SRF feedstock into a synthesis gas (syngas). Each train may contains further equipment such as waste feeders, steam reforming gasifiers with pulse combustors (PCs), carbon trim cells (CTC), and ash systems. The gasifier trains will also feature the partial oxidation reactor (POx) and wet scrubbing units i.e. the primary gas clean up section whereby the syngas is cleaned up of particulates. It is likely that the PCs exhaust (up to 4) will also incorporate SCR for NOx abatement.	Up to 4 x Stacks each 60m in height	Gasification of feedstocks may involve the production of NO_X and PM along with trace elements such as Fe, Ni and As, the emissions of which are dependent on feedstocks. Trace metals or other elements may be present. It should be noted that the syngas produced from the gasification process is subject to the syngas clean-up as described below and thus the only direct emissions from the gasification island will be from the PCs exhausts whereby NOx emissions are to be abated with SCR. Also to note is that there will be Ash Lock Hopper Vent & Purge from Classifier Vent (Both vents from the Gasification Island i.e. up to 4 as per gasification island). These will release small amounts of PM but this will be routed to a bag filter to control particulate emissions down to levels specified within the environmental permit.

Identifier	Component	Description	Plus "Associated Equipment (AE)" (m) e.g. Columns/Stacks	Emissions Source
2	Syngas Compression and Clean-up	Syngas from each of the gasifier trains is combined, compressed and then purified in the secondary gas clean-up unit to reduce the contaminants to suitable levels to avoid damaging the FT catalyst. This secondary gas clean-up unit contains a series of guards to remove each type of contaminant from the syngas, moving through the AGRU with the treated syngas treated in a thermal oxidiser followed by caustic scrubbing (See Component 8). The CO_2 is then recycled back to the gasifier trains within the Gasification Island as well as being exported to the CO_2 pipeline and capture units (see below). This component also contains a PSA unit to recover hydrogen.	Height of Columns in AGRU: Re-absorber: 75m; Hot Regenerator: 60m; CO_2 Absorber: 52m; Flash Column: 40m; Methanol Water Column: 35m; and H2S absorber: 30m.	Syngas compression and clean-up takes place in a sealed system therefore no emissions are expected from this process. The AGRU is a methanol based Rectisol system with outputs passed directly to the thermal oxidiser.
3	FT Synthesis	One Reactor and ancillary equipment shall be installed within the Proposed Scheme and fed by the purified syngas under strict protection measures to ensure no damage to the catalyst. The resulting ultra-clean syngas is then catalytically converted in the Reactor into long chain hydrocarbon waxes and other light hydrocarbon products.	FT Reactor 70m in height; Cat Hopper 55m in height; and Water fractionator 35m in height.	Fractionator is a sealed vessel, therefore no emissions from this process. .
4	Upgrading	The products from the FT Reactor are then processed in the Product Upgrading Unit (PUU) to produce synthetic paraffinic kerosene (SPK) and naphtha. Intermediate storage tanks are	Fractionator vessel 40m in height.	Fractionator is assumed to be a sealed vessel, therefore no emissions are expected from this process.

Identifier	Component	Description	Plus "Associated Equipment (AE)" (m) e.g. Columns/Stacks	Emissions Source
		provided downstream of the FT Reactor to store hydrocarbon condensate and wax so that the PUU can continue operating even during a short shutdown of the FT Reactor.		The charge heater and fractionator heater will result in NO_X emissions from their own exhausts. These may be equipped with SCR dependant on the conditions stipulated within the environmental permit.
5	Flare Area	High pressure and low-pressure gas flares will be provided only for emergency / abnormal operational scenarios.	Two flares (largest up to 130 m in height)	Flaring may result in emissions of NO_X, SOx and particulate matter along with trace elements but will only occur under emergency or abnormal scenarios.
6	Auxiliary POx	An auxiliary POx is included in order to aid in shortening the plant start-up schedule, as well as supplementing lost syngas in the event of waste gasification outage during normal operation.	1 x stack: 30 m in height	This is located within the gasification island and is part of a closed system so may involve the production of NO_x, PM and trace elements.
7	Carbon Capture Unit	CO_2 from the Pulse Combustor Heaters (Gasification Island) and Combined Cycle Gas Turbine (CCGT) flue gas are sent to the Post Combustion Carbon Capture (PCCC) Unit. This is purified/dehydrated (as also is the CO_2 from the acid gas removal unit (AGRU) (as described above), compressed and directed to permanent	DCC: 40 m in height; Absorber: 71.5 m in height; Stripper: 55 m in height; and	Capture of CO_2 emissions can result in emissions of amine and degradation products.

Identifier	Component	Description	Plus "Associated Equipment (AE)" (m) e.g. Columns/Stacks	Emissions Source
		storage via the CO_2 pipeline being developed as part of the Net Zero Teesside (NZT) project. This enables reduction of emissions from the LGF facility and helps reduce the carbon intensity of the final SAF product. It should be noted that: a. If not sent to NZT for storage, the pure CO_2 stream from the AGRU would simply be vented to atmosphere; and b. If NZT capacity is not available, it is unlikely that the CO_2 from the flue gas streams would be captured. The PCCC equipment would likely still be installed but would not be utilised until NZT capacity is available.	Stack at Top of Absorber: 105 m in height	
8	Thermal Oxidiser	Treated syngas from AGRU is further treated in a Thermal Oxidiser followed by caustic scrubbing to remove SO_2 (The Thermal Oxidiser is horizontally oriented). Flue gas passes through caustic scrubber and vent stack on top of scrubber out to atmosphere).	Caustic Scrubber stack 30 m in height	Potential for emissions of SO_2 but these are scrubbed in the caustic scrubber.
14	Powerplant	The CCGT is able to operate on gases from the FT Upgrader off gases, FT Tail gases and naphtha generated in the SAF production	3 x stacks: 40 m in height (2x GT and 1 Aux boiler)	Potential for NO_X emissions from the 2x GT/HRSGs and 1x auxiliary boiler. All

Identifier	Component	Description	Plus "Associated Equipment (AE)" (m) e.g. Columns/Stacks	Emissions Source
		process (as well as natural gas). As above, CO_2 emissions from the power plant can be captured at rates of between 90% and 98%. At the point when NZT becomes operational, CO_2 can be directed to permanent underground storage via the NZT carbon capture pipeline. The power plant will comprise of the following: 2 x Gas Turbine (GT) generators with heat recovery steam generators (HRSGs), Auxiliary boilers, Steam turbines and all associated utility systems. The internal power demand will be based on supplying the SAF production facility as well as power export to the grid for any excess supply not used internally by the SAF process. It shall also provide a balance of steam requirements to the main SAF production facility.		exhausts will be equipped with SCR.
20	Air Separation Unit	An air separation unit (ASU) will be constructed for the production of oxygen and nitrogen required by the SAF Plant	Cold Box 45 m in height Cooling Tower 28 m in height	Depending on the source of energy, combustion products and emissions of volatile organic compounds (VOC): hydrochlorofluorocarbons (HCFC), chlorofluorocarbons (CFC), hydrofluorocarbons (HFC), chlorinated solvents or NH_3 during maintenance or accidentally from the chillers.

Identifier	Component	Description	Plus “Associated Equipment (AE)” (m) e.g. Columns/Stacks	Emissions Source
23	General Administration Facilities	Offices, welfare, control room, stores, maintenance building, laboratories, garages, parking and security.	--	Potential for NO_X, NO_2 and particulate emissions from employee and support vehicles.
24	Process Waste Storage	Ash/Slag/Tramp Storage	--	Stored in sealed silos, but potential for fugitive dust emissions during transfer

--no information available at this stage of the design.

Table 5-8 - Likely Significant Effects from Non-SAF Plant Components

Component	Description	Emission Source
Feedstock Processing and Storage Area	Delivery area and four storage silos providing up to five days of feedstock. Each silo up to 45 m in height.	Particulate matter suspended during feedstock transfer
Bulk Liquid Storage (for SAF and naphtha)	Storage of by-products and products from the SAF process (SAF and naphtha) in an existing liquid tank farm to the east of the Proposed Scheme. A smaller buffer storage area is also proposed at the site of the Proposed Scheme.	Evaporation of SAF and naphtha vapours from storage areas
Pipeline and cable connections (import and export) and Utility Corridors	Utility connections including: ■ Combined heat and power (CHP) connection to the adjacent material resource facility ■ Transport gaseous O_2 and N from the new ASU to the SAF plant ■ Transfer of final products (SAF and naphtha) to and from existing tank farm, on-site buffer storage and rail/freight terminal ■ CO_2 pipeline and connection into the Net Zero Tyneside CCS infrastructure ■ Ancillary pipelines for general use ■ General utilities	Accidental and routine maintenance releases from pipework
Flares	At least one stack up to 130 m above ground level	NO_X, NO_2, SO_X, particulate matter and trace element releases from routine and emergency flaring
Internal conveying corridors	Multiple internal conveyors for connection to feedstock processing, storage areas, SAF plant and rail/freight facility	Particulate matter suspended during feedstock transfer. Evaporation of vapours during product transfer.
Rail Terminal	Existing rail terminal for delivery of feedstock and transport of final products (SAF and naphtha)	Particulate matter suspended during feedstock transfer.

Component	Description	Emission Source
		Evaporation of vapours during product transfer.
Marine Transport Infrastructure	Transport of final products (SAF and naphtha)	Evaporation of vapours during product transfer.
General Administration Facilities	Movement of employee and support vehicles.	Emissions from employee and support vehicles

ELEMENTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

5.7.5. Elements Scoped in or out of further assessment are listed with reference to **Figure 2-3** and **Table 2-1** from **Chapter 2: Site and Proposed Scheme Description** and are shown in **Table 5-9**.

Table 5-9 - Elements Scoped in or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Construction dust	Construction	✔		Potential for nuisance dust impacts at human receptors and designated nature conservation sites
Construction traffic (road)	Construction	✔		Potential for changes in local concentrations of NO_X, NO_2 and particulates from construction vehicles and employee vehicles on the public highway
Construction traffic (marine)	Construction	✔		Potential for changes in local concentrations of NO_X, SO_X, NO_2 and particulates from marine construction transport on the River Tees
Construction plant	Construction	✔		Whilst guidance presented in LAQM.TG(22) suggests that the impacts on local air quality from the operation of construction plant is unlikely to be significant, the potential for impacts will be considered.
Gasification	Operation	✔		Potential emissions of NO_X and particulates to human receptors and designated nature conservation sites.
Syngas Compression and Clean-up	Operation		✔	Closed process. There are no emission points between the input from the previous process and output to the following process, therefore no emissions are assumed.
FT Synthesis	Operation		✔	Closed process. There are no emission points between the input from the previous process and

Element	Phase	Scoped In	Scoped Out	Justification
				output to the following process, therefore no emissions are assumed.
Upgrading	Operation		✔	Closed process. There are no emission points between the input from the previous process and output to the following process, therefore no emissions are assumed.
Flare Area	Operation	✔		Potential emissions of NO_X, SO_X and particulates to human receptors and designated nature conservation sites.
Auxiliary POx	Operation	✔		Potential emissions of NOx and particulates to human receptors and designated nature conservation sites.
Carbon Capture Unit	Operation	✔		Potential amine emissions to human receptors and designated nature conservation sites.
Thermal Oxidiser	Operation	✔		Potential emissions of SO_2 to human receptors and designated nature conservation sites.
Utilities	Operation		✔	No expected emissions.
Wastewater Treatment Plant	Operation		✔	Effluent streams from the SAF processes will be treated in a covered and sealed treatment plant, therefore no airborne pollutants or odour are expected.
Surface Water Pond	Operation		✔	The surface water pond collects uncontaminated surface water from the site of the Proposed Scheme, therefore no odour emissions are expected.
Miscellaneous Tankage	Operation	✔		Potential for evaporative emissions of SAF/naphtha.
Powerplant	Operation	✔		Potential emissions of NO_X to human receptors and designated nature conservation sites.
Sub-Stations & ancillary equipment	Operation		✔	No expected emissions unless backup generators are present.
Maintenance / Laydown/ TAR 1 & 2	Operation		✔	No expected emissions.

Element	Phase	Scoped In	Scoped Out	Justification
Air Separation Unit	Operation	✔		Accidental or planned coolant releases.
Feedstock Silos	Operation		✔	The SRF feedstock is odourless, therefore no emissions are expected.
General Administration Facilities	Operation	✔		Potential for changes in local concentrations of NO_X, NO_2 and particulates from employee and support vehicles
Process Waste Storage	Operation	✔		Potential for odour emissions and surface dust suspension
Feedstock Processing and Storage Area	Operation	✔		Particulate matter suspended during feedstock transfer
Bulk Liquid Storage (for SAF and naphtha)	Operation	✔		Evaporation of SAF and naphtha vapours from storage areas
Pipeline and cable connections (import and export) and Utility Corridors	Operation	✔		Accidental and routine maintenance releases from pipework
Flares	Operation	✔		NOX, NO2, SOX, particulate matter and trace element releases from routine and emergency flaring
Internal conveying corridors	Operation	✔		Particulate matter raised through wind erosion. Covering of conveyors would allow this emissions source to be scoped out.
Rail Terminal	Operation	✔		Rail line is not listed amongst those that may require assessment in LAQM.TG(22) but will be screened against the criteria for assessment of stationary diesel locomotive emissions. Particulate matter suspended during feedstock transfer.
Marine Transport Infrastructure	Operation		✔	Evaporation of vapours during product transfer. Emissions of marine traffic are likely to be small with emissions in quantities highly unlikely to impact

Element	Phase	Scoped In	Scoped Out	Justification
				upon a limited number of human receptors and habitats in the Tees Estuary.

CUMULATIVE EFFECTS

5.7.6. Teesside includes a large number of industrial processes, dense residential areas and major roads. The Proposed Scheme will therefore introduce new air emissions in the area. However, as emissions data from the neighbouring industrial processes is not expected to be available it will not be possible to include them in the detailed, qualitative assessment. Therefore, the contribution from existing emission sources is assumed to be accounted for in the Defra pollutant backgrounds (**Ref. 5.41**). The potential for likely significant effects on cumulative emissions is assumed to be the same as that for operational phase emissions at this stage.

5.8. PROPOSED ASSESSMENT METHODOLOGY

CONSTRUCTION

5.8.1. The assessment of the risk of construction dust impacts will be undertaken according to the guidance provided by the IAQM (**Ref. 5.20**). The assessment takes into account the site activities of demolition, earthworks, construction and trackout of construction vehicles on the public highway. The assessment will take account of the number and proximity of both human receptors and designated conservation sites according to the screening criteria defining the study area.

5.8.2. Where traffic data can be supplied for construction vehicles on the public highway and marine traffic on the River Tees these will be screened against criteria for changes in flows in the IAQM Planning Guidance (**Ref. 5.19**) and LAQM.TG(22) (**Ref. 5.22**) respectively. Should assessment of these elements be required following screening then dispersion modelling will be undertaken using ADMS-Roads for construction traffic emissions and ADMS should marine traffic emissions subsequently meet the screening criteria to be scoped back in, for the following scenarios:

- Baseline (for the purpose of model validation);
- Peak construction year without construction traffic; and
- Peak construction year with construction traffic.

5.8.3. The model will make predictions at discrete human receptor locations within 200 m of the emission sources.

OPERATION

5.8.4. Operational impacts from the Proposed Scheme will be assessed using the ADMS gaussian plume dispersion modelling software from Cambridge Environmental Research Consultants.

5.8.5. The Proposed Scheme is located in a complex area that incorporates a variety of land uses, together with the complex coastal and inter-tidal effects on meteorology that can result in frequent, local temperature inversions and sea mists. The ADMS model can be run with variable terrain and surface roughness in order to simulate such complex situations, and average sea surface temperatures can be applied through the use of the coastline module within the program.

5.8.6. **Table 2-1** from **Chapter 2: Site and Proposed Scheme Description** details a large number of potential emission sources within the Proposed Scheme, not all of which may be emitting constantly, and those that are, may vary in intensity of emissions with time, quality and quantity of feedstock, storage capacity and product demand. The ADMS software allows for the inclusion of time -variable and emission-variable scenarios to be included in the dispersion model should they be required.

5.8.7. The ADMS model will be used to calculate pollutant concentration predictions at local human receptors which will be compared to the limit and objective values for the predictions made.

5.8.8. For the assessment of human health from emissions relating to the SAF production, the following scenarios will be modelled:

- Baseline + Proposed Scheme
- Baseline + Proposed Scheme + Mitigation
- Do- Baseline + Proposed Scheme (worst case operating conditions)

5.8.9. Where predictions for NO_X are made, a conversion to NO_2 will be made based on the following worst-case emitting Environment Agency criteria (**Ref. 5.45**):

- 35% of NO_X is converted to NO_2 for short-term (hourly) average predictions; and
- 70% of NO_X is converted to NO_2 for long-term (annual) average predictions.

5.8.10. Receptor predictions will be made at discrete receptor locations expected to be identified through the use of Ordnance Survey datasets up to 2 km from the Proposed Scheme, however the effectiveness of this will be monitored through the use of an additional coarse receptor grid up to 10 km from the Proposed Scheme to determine the maximum extent of changes in the concentrations of air pollutants. Where technically robust, the monitoring data will be used to validate the predicted model outputs.

5.8.11. A fine resolution receptor grid will also be used to produce detailed isopleths of stack emission impacts.

5.8.12. Generated operational phase road traffic movements are unlikely to be sufficient in number to warrant detailed assessment. It is therefore proposed to assess the road traffic emissions qualitatively.

Carbon Capture

5.8.13. Amine-based solvents are used as a catalyst for the extraction of carbon from fossil fuel emissions. Amines are organic derivatives of ammonia (NH_3) where one or more of the hydrogen (H) atoms is replaced by a substituent organic group. Amines are classed as Primary, Secondary or Tertiary depending on the number of H atoms replaced, ie. one, two or three respectively.

5.8.14. Within the carbon removal process amines can react with substances other than CO2 in order to create new, and potentially harmful, compounds such as nitrosamines and nitramines. This can occur within the CCS process and within the atmosphere following a release of the treated post-combustion flue gases.

5.8.15. Where predictions are made for the concentrations of amines emitted from carbon capture it is assumed that emission rates of trace amines, their nitrogen content and their molecular weight will be provided by the design team to facilitate the dispersion modelling.

5.8.16. In addition, the reaction rates for the amine compounds and self-derived Environmental Assessment Limits (EALs) should be provided by the design team where possible.

5.8.17. The ADMS software incorporates an amine chemistry module that allows for the complex atmospheric chemistry and photochemistry of these compounds once emitted into ambient air.

5.8.18. It is highly likely that the removal of carbon will affect the emission rates at the plant compared to a scenario where carbon were not removed. It is assumed that any emission rates provided for affected plant will take this reduction in volumetric flow into account.

Designated Nature Conservation Sites

5.8.19. The modelling of deposition as a result of NO_X and NH_3 emissions will be undertaken following guidance provided by the IAQM (**Ref. 5.24**) and using the outputs from the ADMS modelling with the application of factors to calculate the rate of nutrient deposition according to the pollutants modelled. The deposition velocities and factors that allow calculation of the rate of deposition can be found in the Environment Agency AQTAG06 guidance (**Ref. 5.25**).

5.8.20. Emissions of amines and associated products from carbon capture can also contribute to nutrient nitrogen deposition due to their nitrogen content as derivatives of ammonia. There are however no established deposition rates for amines to allow for calculation of the deposition flux. A literature review will be conducted to determine the most appropriate deposition velocities to use for amines, nitrosamines and

nitramines. A method is proposed whereby a deposition flux is established through multiple model runs for each amine as follows:

1. Run the respective amine chemistry model runs with amine chemistry switched on and deposition switched off.
2. Run the same model as in Step 1 but with amine chemistry switched off and deposition switched on.
3. Run the same model as in Steps 1 and 2 but with both amine chemistry and deposition switched off.

5.8.21. Using this methodology the ratio of concentration to deposition flux can be calculated from steps 2 (deposition on) and 3 (deposition off) for each receptor location. This can then be multiplied but the concentration output from Step 1 (amine chemistry on) to derive amine deposition fluxes at all receptor locations.

5.8.22. Impact predictions will be made using a regular grid of receptors for those sites nearest and adjacent to the Proposed Scheme such that isopleths can be produced to locate the areas of greatest impact. For more remote sites a receptor on the nearest site boundary point to the Proposed Scheme will be used.

CUMULATIVE EFFECTS

5.8.23. An accurate assessment of cumulative effects would require detailed emission data from all other industrial processes within the study area. This information is not anticipated to be available as it relies purely on the voluntary cooperation of the operators of surrounding plant. On this basis it is assumed that all emissions in the study area that might contribute to cumulative effects on air quality are accounted for in the Defra background pollutant concentrations, and so the Cumulative Effects assessment methodology is the same as that for Operational Effects.

5.8.24. For the assessment of designated sites, it is a specific requirement to assess in-combination effects as defined in paragraph 5.2.4 of the IAQM guidance '*A guide to the assessment of air quality impacts on designated nature conservation sites.'* (**Ref. 5.24**). These effects are cumulative air quality impacts of the project or plan being authorised with other relevant projects and plans that are in the public domain. The methodology to assess these impacts are likely to focus on areas with elevated background and/or baseline concentrations and will be agreed in consultation with Natural England.

5.9. SIGNIFICANCE OF EFFECT CRITERIA

CONSTRUCTION

5.9.1. A final judgement on the significance of effects from the construction of the Proposed Scheme will be made following the IAQM guidance (**Ref. 5.19**) which states that where appropriate mitigation measures are put in place as determined from the dust

risk assessment, it is expected that the impacts of the construction should be negligible and not significant.

5.9.2. The dust risk assessment process and mitigation are intended to be used dynamically throughout the construction process in order to account for unforeseen creation of nuisance dust, complaints received, and observations from site walkovers.

5.9.3. Where emissions from construction traffic on the public highway or River Tees require detailed assessment then the criteria for operational impacts described below and in **Table 5-10** and **Table 5-11** will be used and professional judgement used to determine the significance as for operational impacts.

OPERATION

5.9.4. Significance will be determined through the use magnitude of impact criteria defined by the IAQM (**Ref. 5.19**) for long-term and short-term impacts.

5.9.5. The long-term impact criteria for ambient air pollutants are shown in **Table 5-10**.

Table 5-10 - IAQM Long-term Effect Impact Descriptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to the Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

5.9.6. The descriptors in **Table 5-10** should only be used on long-term (annual) pollutant predictions at individual receptor locations and should be based on model predictions and whole number percentage changes in emissions against the limit or objective value for the given pollutant. The AQAL is the appropriate limit or objective value for a pollutant or the Environment Agency Environmental Assessment Level (EAL).

5.9.7. For short-term impacts on ambient air pollutant concentrations, the IAQM (**Ref. 5.19**) prescribes the criteria shown in **Table 5-11**.

Table 5-11 - IAQM Short-term Effect Impact Descriptors

Peak short-term process concentration range relevant to the AQAL	Magnitude Descriptor	Severity Descriptor
11-20% of AQAL	Small	Slight
21-50% of AQAL	Medium	Moderate
>51% of AQAL	Large	Substantial

5.9.8. The significance of the effect can be determined through the use of the impact descriptors for short- and long-term impacts whilst also taking account a number of factors such as, but not limited to:

- The general sensitivity of the receiving environment;
- The presence of AQMA;
- The existing and future air quality in the receiving environment in the absence of the Proposed Scheme; and
- The extent of current and future population exposure to air pollutants.

5.9.9. The determination of significance of impacts is made on the basis of professional judgement of all the factors from the model outputs and receiving environment. Negligible or Slight effects may be judged as significant if they are sufficiently numerous and geographically concentrated such that cumulatively they might cause a measure of harm to human health. Conversely, moderate or substantial effects may not be judged as significant if they are few in number and sufficiently isolated that the overall risk to human health could be considered to be negligible.

5.9.10. Where an assessment of odour is required, impact and effect descriptors will be determined based on the relative offensiveness benchmarks for the source of odour in the relevant odour-emitting plant or equipment. A judgement of significance will be determined based on model outputs, the general sensitivity of the receiving environment and the established presence of any other odour-emitting process in the area of the Proposed Scheme.

Carbon Capture

5.9.11. The level of impact from the emission of amines and amine derivatives from the carbon capture process will be determined using the IAQM criteria shown in **Table 5-10** and **Table 5-11**. The determination of the significance of impacts will be undertaken using the same level of professional judgement as for fossil fuel emissions.

Designated Nature Conservation Sites

5.9.12. In consultation with Natural England, the assessment of impacts from concentrations of NH_3 and changes to the rates of nutrient nitrogen deposition will be based upon the

1% criteria against Critical Loads and Critical Levels referred to in the IAQM guidance (**Ref. 5.24**) and AQTAG06 (**Ref. 5.25**). Should this criterion be triggered at any location then the results will be passed to the project ecologist to determine the significance of the impact based on the type and condition of the habitats and species present.

CUMULATIVE EFFECTS

Construction

5.9.13. Cumulative Effects from the construction of the Proposed Scheme will be undertaken through a review of all local planning applications with the potential to be under active construction in parallel with the Proposed Scheme within a 500 m radius following the suggested mitigation measure in the IAQM guidance (**Ref. 5.20**) to coordinate construction activities and construction traffic movements on the public highway with all sites within a 500 m radius of the construction site boundary.

OPERATION

5.9.14. The significant of cumulative effects on air quality within the study area will be made using the same criteria from the IAQM guidance (Institute of Air Quality Management, 2017) in **Table 5-10** and **Table 5-11** on the assumption that the emissions from industrial processes and other sources of air pollutants within the study area are accounted for in the Defra background pollutant datasets (**Ref. 5.41**).

5.10. LIMITATIONS AND ASSUMPTIONS

5.10.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- The methodology proposed assumes the provision of all required emissions information by the design team;
- The methodology proposed assumes provision of design data for all processes listed in **Table 2-1** from **Chapter 2: Site and Proposed Scheme Description**;
- The assessment methodology for carbon capture and acid gas removal assumes the provision of all required data by the technology provider, including:
    - Emission rates of all trace amines;
    - Nitrogen content of trace amines;
    - Molecular weight of trace amines;
    - Reaction rates for compounds used in the carbon capture and acid gas removal processes; and
    - Any derived Environmental Assessment Levels for compounds used in the processes.
- Screening of construction traffic and ancillary operational support traffic volumes assumes the timely and accurate provision of traffic flow data;

- The construction dust risk assessment assumes the provision of site plans and construction methodologies/method statements together with types and quantities of materials required and details of any site preparation or earthworks;
- Cumulative emission sources are accounted for in the Defra background air pollutant datasets;

5.11. REFERENCES

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6. NOISE AND VIBRATION

6.1. INTRODUCTION

6.1.1. 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.

6.1.2. A desktop review of the Site and surrounding area has identified sensitive human receptors and ecological receptors. This chapter focuses on the noise and vibration assessment for sensitive human receptors. Further information regarding the noise and vibration assessment of ecological receptors is provided within **Chapter 7: Terrestrial Ecology** and **Chapter 8: Marine and Freshwater Ecology**.

6.2. POLICY, LEGISLATION AND GUIDANCE

6.2.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is as follows:

Table 6-1 - Noise and Vibration – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Noise Policy Statement for England (NPSE) 2010 (**Ref 6.1**)	The NPSE (**Ref 6.1**) was published on 15 March 2010. It sets out the long-term vision for government noise policy, to promote good health and a good quality of life through the management of noise.
National Planning Policy Framework (NPPF) 2021 (**Ref 6.2**)	Last updated in July 2021, the NPPF (**Ref 6.2**) sets out the Government's planning policies for England and how these are expected to be applied. The NPPF superseded Planning Policy Guidance Note (PPG) 24: Planning and noise (**Ref 6.3**) amongst other PPGs and Planning Policy Statements (PPSs). In contrast to PPG 24 (**Ref 6.3**), reference to noise is scant within the NPPF (**Ref 6.2**).
Overarching National Policy Statement (NPS) For Energy (EN-1) 2011 (**Ref 6.4**)	This document sets out that operational noise including ancillary activities associated with development, such as increased road and rail traffic movements, or other forms of transportation should be assessed using the principles of the relevant British Standards where appropriate.
Draft Overarching NPS for Energy (EN-1) 2023 (**Ref 6.5**)	The government has published a draft update to EN-1. For noise and vibration, this 2023 draft EN-1 is largely consistent with the 2011 EN-1.

Policy / Legislation / Guidance	Description
Legislation	
Control of Pollution Act, 1974 (CoPA) (**Ref 6.6**)	CoPA (Ref 6.6) gives local authorities powers to control noise from construction sites and enable developers to apply for prior consent for construction works. Section 72 of that Act defines what is meant by "best practicable means" and requires that regard be had to relevant codes of practice, one of which is British Standard BS 5228 (parts 1 and 2) (**Ref 6.8** and **Ref 6.9**).
Environmental Protection Act 1990 (**Ref 6.7**)	The Environmental Protection Act 1990 (**Ref 6.8**) deals with noise and vibration as a statutory nuisance (but does not directly apply to construction works) and sets out requirements for certain prescribed industrial processes to be controlled (by environmental permits), primarily to control pollution other than noise and vibration.
Guidance	
BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 1: Noise (**Ref 6.8**)	This document provides a prediction methodology for construction noise, determines the approach taken to evaluate noise levels from the construction works and provides basic methods for noise control, amongst other things.
BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 2: Vibration (**Ref 6.9**)	This document determines the approach taken to evaluate and control vibration from the construction works.
Design Manual for Roads and Bridges (DMRB) LA 111 - Noise and vibration. Revision 2 (**Ref 6.10**)	This document determines the approach taken to evaluate noise and vibration levels during both the construction, operation and maintenance of highways projects. Although this is not a highways project, the methodology used to appraise the effects of construction traffic is deemed to be appropriate.
Calculation of Railway Noise 1995 (CRN) (**Ref 6.11**)	Details the prediction methodology for noise from railways.
Calculation of Road Traffic Noise 1988 (CRTN) (**Ref 6.12**)	Details the prediction methodology for noise from road traffic.
BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (**Ref 6.13**)	This document is used for measuring, predicting and assessing the impact of noise from industrial processes and plant items

Policy / Legislation / Guidance	Description
Institute of Environmental Management and Assessment – Guidelines for environmental noise impact assessment: October 2014. (**Ref 6.14**)	Herein known as 'the IEMA Guidelines'. These guidelines address the key principles of noise impact assessment and are applicable to all development proposals where noise effects are likely to occur. The guidelines provide specific support on how noise impact assessment fits within the Environmental Impact Assessment (EIA) process.
Additional Railway Noise Source Terms 1995. (**Ref 6.15**)	This guidance provides updates of the source noise terms for the calculation of railway noise, as presented in CRN (**Ref 6.11**).
Planning Practice Guidance: Noise (**Ref 6.16**)	Advises on how planning can manage potential noise impacts in new development.

6.3. STUDY AREA

6.3.1. The Study Areas considered for sensitive human receptors are as follows:

- For construction noise, a Study Area of 150m from the Site will be adopted. This falls within the distance for which the BS 5228 1:2009+A1:2014 (**Ref 6.8**) prediction methodology is valid. This is considered sufficient to ensure that all potentially significant noise effects will be identified and addressed.
- For construction vibration, a Study Area of 100m from the closest construction activity with the potential to generate vibration will be adopted. This falls within the distance for which the BS 5228 2:2009+A1:2014 (**Ref 6.9**) prediction methodology is valid. Furthermore, DMRB LA111 (**Ref 6.10**) states; "A study area of 100m from the closest construction activity with the potential to generate vibration is normally sufficient to encompass vibration sensitive receptors."
- For construction traffic noise, a 50m Study Area from public roads with an expected increase of 1dB(A) or more due to construction traffic will be adopted. This is in line with the guidance in DMRB LA111 (**Ref 6.10**) which does not require the assessment of effects at receptors more than 50m from works.
- For operational noise from fixed plant and equipment, a Study Area of 500m from the Site will be adopted. This is considered sufficient to ensure that all potentially significant noise effects will be identified and addressed. Sources of operational noise from the Proposed Scheme are anticipated to be located at a distance of greater than 800m from the nearest human receptors. At those receptors, it is anticipated that the noise environment will be dominated by other sources such as road traffic, and that, due to the distance between the source and receiver, noise from the operation of the Proposed Scheme will not lead to a significant effect.
- For operational vibration from fixed plant and equipment, a Study Area of 100m from the Site will be adopted. This is considered sufficient to ensure that all potentially significant vibration effects will be identified and addressed. Sources of

operational vibration from the Proposed Scheme are anticipated to be located at a distance of greater than 800m from the nearest human receptors. It is anticipated that, due to the distance between the source and receiver, vibration from the operation of the Proposed Scheme will not lead to a significant effect.

- For operational rail traffic noise, a 300m Study Area will be adopted for which the CRN (**Ref 6.11**) prediction methodology would be valid. This is considered sufficient to ensure that all potentially significant noise effects will be identified and addressed.

6.3.2. Professional judgement may be used to amend these Study Areas, as appropriate.

6.4. BASELINE CONDITIONS AND FUTURE BASELINE

6.4.1. A desktop study has been prepared at this stage to identify Noise Important Areas (NIAs) (**Ref 6.21**) based on the 3rd round noise mapping for the Environmental Noise Directive (END) (**Ref 6.22**), legally in force in England through the Environmental Noise (England) Regulations (**Ref 6.23**).

6.4.2. The following NIAs have been identified within 500m from the Site:

- IA ID 2344, road source next to the A178 Seaton Carew Road, owned by Stockton-On-Tees Borough Council (SOTBC); and
- IA ID 2343, road next to the A1046 Port Clarence Road, owned by SOTBC.

6.4.3. A Desktop review of the site and surrounding area has also been conducted using online aerial photography and design drawings. The Site is in a predominantly industrial area in Seal Sands, Stockton-on-Tees. To the north, east and south are various commercial and industrial premises including chemicals manufacturers, waste management and power generation sites. The nearest human receptors are in the village of Port Clarence located to the southwest of the Site, whilst several ecologically sensitive areas are located to the south and west of the Site.

BASELINE

6.4.4. It is anticipated that the existing noise environment at the nearest sensitive human receptors in the village of Port Clarence will be dominated by road traffic on the A1046 Port Clarence Road, and to a lesser extent the A178 Seaton Carew Road and surrounding network. From the online England Noise and Air Quality Viewer Extrium (**Ref 6.17**), the noise levels at the nearest sensitive residential receptors to the southwest of the Site are between 55dB and 65dB LAeq,16hr during daytime and between 50dB and 60dB Light during night time with respect to road traffic noise only. These levels provide an indication of the baseline road traffic noise climate in the area, and are presented in **Figure 6-1** and **Figure 6-2.**

Figure 6-1 - Daytime Road Traffic Noise Level, Figures in dB LAeq, 16hr

Figure 6-2 - Night-time Road Traffic Noise Level, Figures in dB Lnight

6.4.5. Noise generated by activities associated with the industrial premises situated beyond the Port Clarence Road may also contribute to the existing noise environment at the nearest sensitive human receptors to the southwest of the Site, particularly during lulls in road traffic during the night-time period.

6.4.6. Noise and vibration baseline information will be developed further during the PEIR and ES processes, including undertaking a baseline noise survey at representative human receptors.

6.4.7. Further information on the baseline environment in relation to, and the presence of, ecological receptors is provided in **Chapter 7: Terrestrial Ecology** and **Chapter 8: Marine and Freshwater Ecology**.

FUTURE BASELINE

6.4.8. It is not anticipated that any major proposed developments are in the planning process which would substantially change the future baseline noise levels.

6.4.9. The future baseline noise environment at sensitive human receptors would be determined by any changes in road and rail traffic movements and other noise sources associated with nearby developments.

6.5. SENSITIVE RECEPTORS

6.5.1. The Proposed Scheme and the commercial and industrial premises surrounding the Site are not considered to be noise and vibration sensitive receptors.

HUMAN RECEPTORS

6.5.2. Sensitive human receptors are considered to be places where the public may be exposed to noise and vibration arising from the Proposed Scheme.

6.5.3. There are human receptors including:

- Residential properties at Seaton Carew Road including Saltview Terrace;
- Residential properties at Port Clarence Road including Samphire Street; and
- High Clarence Primary School located on Port Clarence Road.

6.5.4. The closest of these human receptors are approximately:

- 10m from the internal Heavy Haulage Road which will carry construction traffic from the marine loading facilities to the construction site, and potential improvement works to Port Clarence Road or the Heavy Haulage Road, should these be required;
- 80m from the nearest operational aspect of the Proposed Scheme (southern extent of the Railway Terminal); and
- 1,600m south-west of the SAF Plant Site.

ECOLOGICAL RECEPTORS

6.5.5. Further information on sensitive ecological receptors is provided within **Chapter 7: Terrestrial Ecology** and **Chapter 8: Marine and Freshwater Ecology**.

6.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

6.6.1. Relevant design, mitigation and enhancement measures will be identified in the ES. For human receptors, the mitigation measures outlined below will be considered.

6.6.2. Further information on relevant design, mitigation and enhancement measures for ecological receptors is provided in the relevant Ecology chapters.

CONSTRUCTION PHASE

6.6.3. Some of the opportunities for mitigation during the construction phase of the Proposed Scheme are likely to include embedded mitigation measures such as measures set out in the Code of Construction Practice (CoCP), associated Noise Management Plans, and Best Practicable Means (BPM) as defined in the Control of Pollution Act, 1974 (**Ref 6.6**), which will be detailed in the ES. Best Practice mitigation measures during the construction phase are anticipated to include:

- Prior consent agreement for any works outside core hours, where there is potential for significant adverse effects;
- Contact details for nominated site contact for local residents to deal with complaints and engaging with local residents;
- Selection of quiet and low noise equipment and methodologies;
- Optimal location of acoustic screening to minimise adverse noise effects;
- Optimal location of equipment on site to minimise noise disturbance;
- The provision of acoustic enclosures around static plant, where necessary; and
- Use of less intrusive alarms, such as broadband vehicle reversing warnings.

OPERATION PHASE

6.6.4. The Overarching NPS for Energy EN-1 (**Ref 6.4**) states that mitigation measures may include engineering methods, such as noise reduction at point of generation, considerations related to the layout, for instance to ensure adequate distance between source and sensitive receptor, and administrative restrictions for example by specifying noise limits.

6.6.5. Mitigation measures during the operation phase are anticipated to include:

- Selecting the location of plant and equipment on site to minimise noise impacts;
- Noise limits on the operation phase;
- Careful selection of the plant to be operated at the site, e.g., selecting plant with low sound power levels; and
- Noise-attenuating barriers in the form of either acoustic screens and/or earth bunds.

6.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

6.7.1. The following are considered to have the potential to give rise to significant effects and have been scoped in for the proposed assessment for human receptors:

- Disturbance as a result of noise and vibration generated by on-site construction activities of the Proposed Scheme; and

- Changes in road traffic noise as a result of development generated construction traffic on the local road network.

6.7.2. It is anticipated that any potential noise and vibration effects arising from the construction phase of the Proposed Scheme will be temporary in nature.

6.7.3. The following are not considered to have the potential to give rise to significant effects and have been scoped out of the proposed assessment for human receptors:

- Vibration as a result of development generated construction traffic on the local road network.

OPERATION PHASE

6.7.4. The following are considered to have the potential to give rise to significant effects and have been scoped in for the proposed assessment for human receptors:

- Changes in rail noise as a result of development generated rail movements to and from the existing rail terminal operated by Navigator.

6.7.5. It is anticipated that any potential noise and vibration effects arising from the operation phase of the Proposed Scheme will be of long-term nature until decommissioning.

6.7.6. The following are not considered to have the potential to give rise to significant effects and have been scoped out of the proposed assessment for human receptors:

- Noise and vibration from commercial and fixed plant associated with the Proposed Scheme; and
- Changes in road traffic noise as a result of development generated traffic on the local road network.

ELEMENTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

6.7.7. A summary of the potential likely significant effects scoped in and out of the assessment for sensitive human receptors are set out in **Table 6-2** below:

Table 6-2 - Elements Scoped in or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Noise and vibration impacts arising from the construction of the Proposed Scheme	Construction	✔		Works are anticipated to take place within the specified 150m and 100m Study Areas for noise and vibration respectively. It is, therefore, anticipated that significant effects are possible.

Element	Phase	Scoped In	Scoped Out	Justification
Road traffic noise impacts arising from construction of the Proposed Scheme	Construction	✔		Construction traffic movements are anticipated near noise-sensitive receptors, particularly along the Port Clarence Road. It is, therefore, anticipated that significant effects are possible.
Construction traffic vibration impacts arising from construction of the Proposed Scheme	Construction		✔	The vibration generated by construction traffic vehicles would be similar to the vibration caused by any other similar vehicles that could legally use the route. It is, therefore, anticipated that significant effects are unlikely to occur.
Noise impacts arising from the operation of the Proposed Scheme	Operation		✔	Fixed plant and equipment are not anticipated to be located within the specified 500m Study Area for noise. It is, therefore, anticipated that significant effects are unlikely. Sources of operational noise from the Proposed Scheme (in this case the rail terminal) are anticipated to be located at a distance of more than 800m from the nearest human receptors. At those receptors, it is anticipated that the noise environment will be dominated by other sources such as road traffic. Due to the distance between the source and receiver, it is anticipated that noise from the operation of the Proposed Scheme is unlikely to lead to a significant effect.
Vibration impacts arising from the operation of the Proposed Scheme	Operation		✔	Fixed plant and equipment are not anticipated to be located within the specified 100m Study Area for vibration. Sources of operational vibration from the Proposed Scheme are anticipated to be located at a distance of more than 800m from the nearest human receptors. It is

Element	Phase	Scoped In	Scoped Out	Justification
				anticipated that, due to the distance between source and receiver, vibration from the operation of the Proposed Scheme is unlikely to lead to a significant effect.
Road traffic impacts arising from the operation of the Proposed Scheme	Operation		✔	It is anticipated that changes to traffic flows will be minimal. It is, therefore, anticipated that significant effects are unlikely.
Rail noise impacts arising from the operation of the Proposed Scheme	Operation	✔		Rail movements to and from the existing rail terminal during the operation phase have the potential to impact on noise-sensitive receptors on Port Clarence Road. It is, therefore, anticipated that a significant effect is possible.

6.7.13. Further information on the elements of assessment scoped in and out of further assessment for the ecological receptors is provided in **Chapter 7: Terrestrial Ecology** and **Chapter 8: Marine and Freshwater Ecology**. Further information on the proposed construction and operational traffic movements is provided in **Chapter 18: Traffic and Transport**.

6.8. PROPOSED ASSESSMENT METHODOLOGY

6.8.1. The adopted assessment methodology for sensitive human receptors will be applied to demonstrate compliance with national policy and allow determination of whether significant environmental effects are likely to arise as a result of the Proposed Scheme. The adopted assessment methodology draws upon the policies and guidance in **Chapter 4: Planning and Energy Policy** as applicable to each impact being assessed.

6.8.2. Where appropriate, noise predictions will be carried out for sensitive terrestrial and marine ecological receptors and further details on the Proposed Assessment Methodology and the Significance of Effect Criteria will be developed further in the respective chapters of the PEIR and ES.

BASELINE NOISE LEVELS

6.8.3. A detailed baseline noise survey will be undertaken to establish the prevailing conditions at sensitive human receptors in the vicinity of the Proposed Scheme. Measurements will be undertaken at up to two locations in Port Clarence representative of the sensitive receptors to the southwest of the Proposed Scheme,

i.e. along Port Clarence Road and in the vicinity of the internal heavy haul route and the railway line. The measurement locations will be discussed and agreed with STBC prior to the commencement of the noise survey.

6.8.4. The survey will be undertaken over a single weekday daytime and night time period. This will be discussed and agreed with the Environment Health Department of STBC. All measurements will be carried out using sound level meters compliant with Class 1 specification, as set out in BS EN 61672-1: 2013 (**Ref 6.18**). All measurement equipment will be installed by a consultant competent in environmental noise monitoring, and in general accordance with the principles of BS 7445-2: 1991 (**Ref 6.19**).

CONSTRUCTION PHASE

Construction Noise

6.8.5. Construction noise will be assessed using the guidance in BS 5228:2009+A1:2014 Part 1 (**Ref 6.8**). The results of the baseline noise survey will be used to determine appropriate construction noise level thresholds. Predictions of noise from the construction of the Proposed Scheme, including the use of the internal heavy haulage road (within the Site), will be assessed against those thresholds. Predictions will be undertaken for a sample of the closest sensitive human receptors for each relevant construction phase of the Proposed Scheme.

6.8.6. Appropriate mitigation measures will be presented, including best practicable means (BPM) and the good practice recommendations presented in BS 5228-1 (**Ref 6.8**).

Construction Vibration

6.8.7. Construction vibration would be assessed using the guidance in BS 5228:2009+A1:2014 Part 2 (**Ref 6.9**) and DMRB LA 111 (**Ref 6.10**) as appropriate. For a sample of construction activities that have the potential to produce vibration (e.g. piling and internal heavy haulage road construction activities), vibration impact (i.e. human exposure) will be determined at a series of set-back distances for the sensitive human receptors. Appropriate mitigation measures will be presented, including BPM and the good practice recommendations presented in BS 5228-2 (**Ref 6.9**).

Construction Traffic Noise

6.8.8. The assessment of temporary construction traffic noise on the public highway will be carried out using the guidance in DMRB LA111 (**Ref 6.10**). This will involve a desktop study informed by traffic movements provided by the Project Team. Noise level calculations will be undertaken in accordance with the methodology contained within CRTN (**Ref 6.12**) and the associated noise changes due to the construction traffic arising from the Proposed Scheme would be assessed using the guidance set out in DMRB LA111 (**Ref 6.10**).

6.8.9. Whilst routes for construction traffic are yet to be finalised and anticipated levels of construction traffic unknown, professional judgement will be used to determine whether the study area needs to be redefined. This will include consideration of distance between routes and sensitive receptors, times of day for the vehicle movements and the existing noise environment at the receptors.

OPERATION PHASE

Development Generated Rail Noise

6.8.10. The assessment of the permanent operational noise from rail movements associated with the Proposed Scheme will be carried out using the guidance in IEMA Guidelines (**Ref 6.14**).

6.8.11. Predictions will be undertaken for a sample of representative sensitive human receptors using the Calculation of Railway Noise (CRN) (**Ref 6.11**) procedure developed by the Department of Transport in 1995. The predictions will be based on a number of criteria including:

- The frequency of service (including both passenger and freight trains);
- Train type, length and number of carriages;
- Train speed;
- Track type (continuously welded rail or jointed);
- Locations of cuttings, bridges and structures; and
- Gradients and other areas where the train is likely to be 'on-power'/accelerating.

6.8.12. The calculation procedure also includes additional noise source terms provided in the Additional Railway Noise Source Terms 1995 (**Ref 6.15**).

6.8.13. The evaluation of rail noise likely to be experienced as a result of the operation of the Proposed Scheme will be assessed by comparing the change in ambient noise levels with the Proposed Scheme in operation, against the measured baseline using the IEMA Guidelines (**Ref 6.14**).

SIGNIFICANCE OF EFFECT CRITERIA

6.8.14. The following paragraphs set out the methodology for determining the magnitude of impact and significance of effect for the Noise and Vibration assessment. The significant effect level criteria for both construction and operation phases will be discussed and agreed with the Environment Health Department of STBC. It is anticipated that the principles in the Noise Policy Statement for England (NPSE) (**Ref 6.1**) and the Overarching National Policy Statement or Energy EN-1 (**Ref 6.4**) will be considered.

Construction Phase

Construction Noise

6.8.15. For construction noise, the significance of effect criteria are derived from the guidance in BS 5228-1 (**Ref 6.8**). The Standard provides methods for determining the significance of construction noise levels by considering the change in the ambient noise level that would arise as a result of the construction operations. The ABC example assessment method is presented in **Table 6-3**.

Table 6-3 - Example threshold of potential significance effect at dwellings - ABC method

Assessment category and threshold value period	Threshold value, in decibels $L_{Aeq,T}$ (dB)		
	Category (A)[A]	Category (B)[B]	Category (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 effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

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

NOTE 3: Applied to residential receptors only.

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

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

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

(D) 19.00-23.00 weekdays, 13.00-23.00 Saturdays and 07.00-23.00 Sundays

6.8.21. For construction noise, the magnitudes of impact have been determined based upon the margin by which predicted construction noise levels will comply with or exceed the receptor construction noise assessment criteria when following the ABC assessment method detailed within BS 5228-1 (**Ref 6.8**). **Table 6-4** details the resulting magnitude of impact to be applied.

Table 6-4 - Construction Noise – Magnitude of Impact

Construction noise level (x) ($L_{Aeq,T}$, dB)	Magnitude of Impact
x < Receptor ABC assessment criteria	Negligible
Receptor ABC assessment criteria ≤ x < Receptor ABC assessment criteria +5dB	Low to Medium
Receptor ABC assessment criteria +5 ≤ x	Medium to High

6.8.24. Construction noise may be considered a significant adverse effect where it is determined that a medium or high magnitude of impact will occur to a noise sensitive receptor for a duration exceeding:

- Ten 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 Vibration

6.8.25. For construction vibration, the significance of effect criteria are derived from the guidance in BS 5228-2 (**Ref 6.9**). Guidance criteria are suggested for the assessment of the significance of vibration effects; such criteria are provided in terms of Peak Particle Velocities (PPV) and are concerned with both human and structural responses to vibration. Those applicable to human perception and disturbance and the magnitude of impact according to the guidance are presented in **Table 6-5**.

Table 6-5 - Guidance Criteria for the Assessment of Significance of Vibration for Human Perception and Disturbance (from BS 5228-2:2009+A1:2014)

Vibration level A), B), C) (PPV)	Effect	Magnitude of impact
0.14 mms-1	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Negligible
0.3 mms-1	Vibration might be just perceptible in residential environments.	Low
1.0 mms-1	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.	Medium
10 mms-1	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.	High
A) The magnitudes of the values presented apply to a measurement position that is representative of the point of entry into the recipient.		

B) A transfer function (which relates an external level to an internal level) needs to be applied if only external measurements are available.

C) Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS6472-1 or BS6472-2, and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment.

6.8.29. Construction vibration is considered a significant effect when it is determined that a medium or high magnitude of impact will occur for a duration exceeding:

- Ten 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 Traffic Noise

6.8.30. For construction traffic noise, the magnitude of impact criteria are determined based upon the classification of noise level changes for construction traffic as detailed within the LA 111 (**Ref 6.11**). The terminology used within this scale has been updated to reflect that being used in this assessment. The resulting magnitude of impact criteria are detailed in **Table 6-6**.

Table 6-6 - Magnitude of Impact at Receptors

Magnitude of Impact	Increase in BNL if closest public road used for construction traffic (dB)
High	Greater than or equal to 5.0
Medium	Greater than or equal to 3.0 and less than 5.0
Low	Greater than or equal to 1.0 and less than 3.0
Negligible	Less than 1.0

6.8.33. Construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

- Ten or more days or nights in any 15 consecutive days or nights; and
- A total number of days exceeding 40 in any 6 consecutive months.

Operation Phase

Rail Noise

6.8.34. The assessment will use the IEMA Guidelines (**Ref 6.14**) recommended approach for the classification of magnitude of impact, sub divided into short term impacts and long term impacts. However, it is considered unlikely that long-term rail traffic data will be available and it is considered proportionate to carry out a short-term assessment only

which will consider the Opening Year of the operation of the Proposed Scheme and assuming that the development will run at capacity.

6.8.35. **Table 6-7** sets out the guideline noise assessment framework for magnitude of impact and significance of effects for operational rail noise as a result of the Proposed Scheme.

Table 6-7 - Guideline Impact and Effect Assessment Framework – Short Term Noise Change (Rail)

6.8.36. 6.8.37.

Noise Level Change, $L_{Aeq\ T}$ dB T = either 16hr day or 8hr night	Magnitude of Impact	Significance of Effect
0 < 1	Negligible	No Effect
1 < 3	Low	Minor Adverse
3 < 5	Medium	Minor to Moderate Adverse: Depending on context
>5	High	Moderate to Major Adverse: Depending on context

6.9. LIMITATIONS AND ASSUMPTIONS

6.9.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- Noise surveys are proposed on the basis that the noise climate during early stages of the EIA process will be representative of the typical baseline conditions. Should any events, such as new or further COVID-19 restrictions, indicate that a baseline noise survey has the potential to capture conditions that are not typical, then an alternative approach will be discussed and agreed with the Environment Health Department of STBC; and
- The assessment presented in the PIER and ES will include the latest design information available at the time of our submission. Where design information is not available, worst case assumptions will be made.

6.10. REFERENCES

Ref 6.1: Department for Environment, Food and Rural Affairs (2010), Noise Policy Statement for England. Available at:

https://www.gov.uk/government/publications/noise-policy-statement-for-england-npse

Ref 6.2: Ministry of Housing, Communities & Local Government (March 2012 (Updated July 2021)), National Planning Policy Framework NPPF. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

Ref 6.3: Department for Communities and Local Government (September 1994), Planning Policy Guidance 24: Planning and Noise

Ref 6.4: Department of Energy and Climate Change (2011) 'Overarching National Policy Statement or 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 6.5: Department for Energy Security & Net Zero (2023) Draft 'Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf

Ref 6.6: UK Government (1974), Control of Pollution Act (1974) Part III – Noise. Available at:

https://www.legislation.gov.uk/ukpga/1974/40/part/III/enacted

Ref 6.7: UK Government (1990), Environmental Protection Act. Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents

Ref 6.8: British Standards Institution (2009), BS 5228:2009 + A1:2014. Code of practice for noise and vibration control on construction and open sites – Part 1: Noise. London: BSi.

Ref 6.9: British Standards Institution (2009), BS 5228:2009 + A1:2014. Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration. London: BSi.

Ref 6.10: National Highways, Design Manual for Roads and Bridges, LA 111, Revision 2, 2020, Noise and Vibration. Available at:

https://www.standardsforhighways.co.uk/tses/attachments/cc8cfcf7-c235-4052-8d32-d5398796b364

Ref 6.11: Department of Transport (July 1994), Calculation of Rail Noise 1995 (CRN)

Ref 6.12: Department of Transport Welsh Office (1988), Calculation of Road Traffic Noise 1988 (CRTN). Available at: https://www.bradford.gov.uk/Documents/Hard%20Ings%20Road%20improvement%20scheme/2b%20Compulsory%20Purchase%20Order%20and%20Side%20Road%20Order/5%20Supporting%20documents/Calculation%20of%20Road%20Traffic%20Noise%201988.pdf

Ref 6.13: British Standards Institution (2014), BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. London: BSi.

Ref 6.14: Institute of Environmental Management and Assessment (2014), – Guidelines for environmental noise impact assessment: October 2014. Available at: https://www.iema.net/download-document/236678

Ref 6.15: Department of Transport (January 2007), Additional Railway Noise Source Terms 1995.

Ref 6.16: Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (March 2014 (Updated July 2019)), Planning Practice Guidance: Noise. Available at: https://www.gov.uk/guidance/noise--2

Ref 6.17: Extrium (2023), 'England Noise Map Viewer'. Available at: www.extrium.co.uk/noiseviewer.html

Ref 6.18: British Standards Institution (2013), BS EN 61672-1: 2013. Electroacoustics. Sound level meters Specifications. London: BSi

Ref 6.19: British Standards Institution (1991), BS 7445-2: 1991: Description and Measurement of Environmental Noise. Guide to the Acquisition of Data Pertinent to Land Use. London: BSi.

Ref 6.20: British Standards Institution (2010) BS ISO 4866:2010 Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures. London: BSi.

Ref 6.21: DEFRA (2020) Noise Action Planning Important Areas Round 3 England. Available at: https://data.gov.uk/dataset/948d6c4c-772e-4f55-9f39-97508e1cc701/noise-action-planning-important-areas-round-3-england

Ref 6.22: European Commission (2002) Directive 2002/49/EC of the European Parliament relating to the assessment and management of environmental noise. Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0049:en:NOT

Ref 6.23: UK Government (2018) The Environmental Noise (England) (Amendment) Regulations 2009. Available at: https://www.legislation.gov.uk/uksi/2018/1089/made

7. TERRESTRIAL ECOLOGY

7.1. INTRODUCTION

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

7.1.2. This assessment does not duplicate information set out in **Chapter 8: Marine and Freshwater Ecology**.

7.2. CONSULTATION

7.2.1. Some consultation has been undertaken with Natural England via their Discretionary Advice Service (DAS) to discuss certain aspects of the terrestrial ecology assessment and help refine the scope and, in particular, the Study Area (see **Section 7.4**). At this point the consultation has focussed on breeding and wintering birds (see **Table 7-2**).

7.3. POLICY, LEGISLATION AND GUIDANCE

7.3.1. A summary of the international, national and local legislation, planning policy and guidance relevant to the terrestrial ecology assessment for the Proposed Scheme is set out below in **Table 7-1**:

Table 7-1 – Terrestrial Ecology – 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**)	NPS EN-1 contains a number of policy statements of key relevance for the purpose of the assessment of environmental impacts on ecological features. Key policies relate to: ■ Consideration of whether a project may have a significant effect on a European site, or any site afforded the same protection, such as Ramsar sites (Paragraphs 4.3.1 and 5.3.9). ■ Aiming to avoid significant harm to biodiversity conservation interests, and seeking appropriate compensation where significant harm cannot be avoided (Paragraph 5.3.7). ■ Avoiding granting planning consent in the first instance where a proposed development is likely to have an adverse effect of a Site of Special Scientific Interest (SSSI), either alone or in combination with other developments. An exception should only be made where the benefits (including need) of the development clearly outweigh any adverse effects (Paragraph 5.3.11).

Policy/Legislation/Guidance	Description
	■ The important role played by sites of regional and local biodiversity value, including Local Nature Reserves (LNRs) and Local Sites, in meeting overall national biodiversity targets (Paragraph 5.3.13). ■ Avoidance of the loss of ancient woodland and veteran trees (Paragraph 5.3.14). ■ The use of planning obligations to ensure that other species and habitats of principal conservation importance are protected from the adverse effects of development (Paragraph 5.3.17).
Draft Overarching NPS for Energy (EN-1) 2023 (**Ref 7.2**)	The government has published a draft update for EN-1. This updates the existing NPS with the addition of the principles of Biodiversity Net Gain (BNG), 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 7.3**)	The NPPF sets out the Government's planning policies for England and Wales and how these are expected to be applied. The Framework acts as guidance for local planning authorities and decision-makers, both in drawing up plans and making decisions about planning applications. 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: ■ Protect and enhance sites of biodiversity value in a manner relative to their identified quality or statutory status. ■ Recognise the wider benefits of natural capital and ecosystem services. ■ Minimise impacts on, and provide net gains for, biodiversity. Section 15, Paragraph 180 states that local planning authorities should apply the following principles when determining planning applications: ■ Planning permission should be refused if significant harm to biodiversity resulting from a development cannot be avoided, adequately mitigation or, as a last resort, compensated for. ■ Development likely to have an adverse effect on a SSSI (either alone or in combination with other developments) should not normally be permitted. The exception would be where benefits of the development clearly outweigh any adverse effects. ■ Development resulting in the loss or deterioration of irreplaceable habitats, such as ancient woodland, should be refused, unless there are wholly exceptions reasons and suitable compensation can be provided.

Policy/Legislation/Guidance	Description
	▪ Any development whose primary objective is to conserve or enhance biodiversity should be supported. Opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure net gains for biodiversity.
Stockton-on-Tees Borough Council - Local Plan - Adopted 30 January 2019 (**Ref 7.4**).	The Local Plan sets out the Council's policies and proposals to guide planning decisions and establishes the framework for the sustainable economic growth and development of the Borough up to 2032. Policy ENV5 'Preserve, Protect and Enhance Ecological Networks, Biodiversity and Geodiversity' states that: ▪ Development proposals will be supported where they enhance nature conservation and management, preserve the character of the natural environment and maximise opportunities for biodiversity particularly in or adjacent to Biodiversity Opportunity Areas in the River Tees Corridor, Teesmouth and Central Farmland Landscape Areas. ▪ The Council will preserve, restore and re-create priority habitats alongside the protection and recovery of priority species. ▪ Ecological networks and wildlife corridors will be protected, enhanced and extended. A principal aim will be to link sites of biodiversity importance by avoiding or repairing the fragmentation and isolation of natural habitats. ▪ Sites designated for nature conservation will be protected and, where appropriate enhanced, taking into account internationally designated sites, nationally designated sites and locally designated sites. ▪ Existing trees, woodlands and hedgerows which are important to the character and appearance of the local area or are of nature conservation value, will be protected wherever possible. Where loss is unavoidable, replacement of appropriate scale and species will be sought on site, where practicable. Paragraph 8.61 states that *"It is important that the impact of development proposals on trees, woodlands and hedgerows is taken into consideration during the design stage of proposals and that wherever possible, they are retained, unless loss is unavoidable in which case replacement provision will be sought. This policy covers not only those trees, woodlands and hedgerows that are covered by Trees Preservation Orders and those within conservation areas, but also extends to cover those that are of importance to the character and appearance of the local area or are of nature conservation value"*.
Legislation	
The Wildlife and Countryside Act 1981 (as amended) (WCA) (**Ref. 7.5**)	This is the primary legislation for the protection of animals, plants and habitats in the UK. This legislation covers three main areas:

Policy/Legislation/Guidance	Description
	■ 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).
The Countryside and Rights of Way (CRoW) Act (**Ref 7.6**)	The CRoW Act has amended the WCA in England and Wales, strengthening the protection afforded to SSSIs and the legal protection for threatened species. It adds the word 'reckless' to the wording of the offences listed under Section 9(4) of the WCA. This alteration makes it an offence to recklessly commit an offence, where previously an offence had to be intentional to result in a breach of legislation.
The Natural Environment and Rural Communities (NERC) Act 2006 (**Ref 7.7**)	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 CRoW Act. Section 40 of the NERC Act imposes a duty on public authorities to *"in exercising (their) 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') (**Ref 7.8**)	The Conservation of Habitats and Species Regulations 2017 (as amended) (the 'Habitats Regulations') consolidate the Conservation of Habitats and Species Regulations 2010 with subsequent amendments. The Habitats Regulations transpose The Habitats Directive (EC Directive 92/43/EEC) into national law. They also transpose elements of The Birds Directive in England and Wales. All species listed under Annex IV of the Habitats Directive require strict protection and are known as European Protected Species (EPS). Under Regulation 42 of the Habitats Regulations, it is unlawful to: ■ deliberately kill, capture or disturb; ■ deliberately take or destroy the eggs of; and ■ damage or destroy the breeding site/resting place of any species protected under this legislation. If it is determined that impacts to an EPS during a development are unavoidable then the works may need to be carried out under a site-specific

Policy/Legislation/Guidance	Description
	mitigation licence from the Statutory Nature Conservation Organisation, in this case Natural England. Certain EPS are also listed under Annex II of the Habitats Directive and are afforded protection by the establishment of core areas of habitat known as Special Areas of Conservation (SACs). In addition, all bird species listed under Annex I of the Birds Directive are rare or vulnerable and afforded protection by the classification of Special Protection Areas (SPAs). This means that 'Annex II species' under the Habitats Directive and Annex I bird species under the Birds Directive are a relevant consideration in a Habitats Regulations Assessment (HRA). Following the UK's exit from the EU, the Habitats Regulations were amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. The changes made were only those necessary to ensure that they remain operable now that the UK has left the EU.
The Ramsar Convention (**Ref 7.9**)	The UK is a signatory to the Ramsar Convention. The Convention has three main 'pillars' of activity: the designation of wetlands of international importance as Ramsar sites, the promotion of the wise use of all wetlands in the territory of each country, and international co-operation with other countries. The UK has chosen to underpin the designation of its Ramsar sites through prior notification of these areas as SSSIs in England. Accordingly, these receive statutory protection under the WCA 1981 (as amended) (see above). The UK Government has also issued policy statements relating to the special status of Ramsar sites. This extends the same protection at a policy level to listed Ramsar sites in respect of new development as that afforded to SACs and SPAs.
The Environment Act 2021 (**Ref 7.10**)	The Environment Act 2021 has two main functions: ■ To give a legal framework for environmental governance in the UK. ■ To bring in measures for improvement of the environment in relation to waste, resource efficiency, air quality, water, nature and biodiversity, and conservation. The Act includes provisions to strengthen and improve the existing duty on public bodies to conserve and enhance biodiversity, including mandating BNG through the planning system. Schedule 14 of the Act makes provision for BNG to be a condition of planning permission in England. 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. It is expected that the mandatory requirement for a 10% gain for NSIPs will come into force in 2025. The vast majority of this Act does not make any immediate changes for organisations other than regulators. Changes to duties for businesses and

Policy/Legislation/Guidance	Description
	other organisations are expected in subsequent legislation made under this Act.
Protection of Badgers Act 1992 (**Ref 7.11**)	The Protection of Badgers Act makes it illegal to wilfully take, kill, injure, possess or ill-treat a badger. Under the Act, badger setts are also protected against intentional or reckless interference. Sett interference includes damaging or destroying a sett, obstructing access to any part of the sett, and disturbing 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 takes this definition to include seasonally-used setts that are not occupied but that show signs of recent use by badgers. If impacts to badgers or their setts are unavoidable during a development then authorised sett disturbance requires a mitigation licence, issued by Natural England.
Guidance	
CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland (**Ref 7.12**)	The terrestrial ecology assessment has been undertaken using the approach detailed in the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment (EcIA), hereafter referred to as 'the CIEEM EcIA guidelines'. These guidelines represent the current best practice for assessing the ecological impacts of development projects.
BS 42020: 2013 Biodiversity — Code of practice for planning and development (**Ref 7.13**)	BS 42020: 2013 provides recommendations for making sure that decisions taken at each step of the planning process are informed by appropriate ecological information.
BS 5837:2012 – Trees in relation to design, demolition and construction – Recommendations (**Ref 7.14**)	BS 5837:2012 gives recommendations and guidance on the relationship between trees and the design, demolition and construction process. It sets out the principles and procedures to be applied to achieve a harmonious and sustainable relationship between trees and structures.
Natural England/Forestry Commission (2022). Ancient woodland, ancient trees and veteran trees: advice for making planning decisions (**Ref 7.15**)	This best practice guidance provides principles to adopt with specific reference to protection measures for ancient/veteran trees.

7.4. STUDY AREA

7.4.1. The Site covers a total area of 205.66 ha, which includes the main construction areas forming part of the Proposed Scheme, as well as access routes, temporary compounds and working areas required to undertake the Proposed Scheme.

7.4.2. The Study Area for the Proposed Scheme, with regard to terrestrial ecology, is defined as the area in which impacts arising from construction and/or operation could lead to significant effects for ecological receptors. For the purpose of this assessment, it is necessary to apply Study Areas of varying sizes depending on the ecological receptor/feature under assessment and, in most cases, these will extend beyond the Site. These will hereafter be referred to as 'Zones of Influence' (ZoI) for each receptor.

7.4.3. ZoI have been defined based on current best practice guidelines (summarised in **Table 7-2** below) and currently available project information. In some cases, ZoI have been defined on a precautionary basis using professional judgement alongside current guidance and available project information. This is to ensure a sufficient geographical area has been assessed to allow all reasonably foreseeable impacts to be taken into account. As the terrestrial ecology assessment progresses and further information becomes available, both in terms of survey results and project details/design, it is considered that one or more of the ZoI may be subject to refinement later in the project lifecycle.

7.4.4. It is proposed that further consultation will be undertaken with Natural England (see **Section 7.2**), as well as with Stockton-on-Tees Borough Council (STBC), to discuss the proposed approach to field surveys and assessment, with agreed ZoI.

Table 7-2 - Terrestrial Biodiversity Zones of Influence

Receptor	Zone of Influence (inclusive of the Site)
Statutory designated sites of international importance[1]	Within 10km of the Site.
Statutory designated sites of national importance[2];	Within 2km of the Site.
Non-statutory designated sites[3]	Within 2km of the Site.
HPI and woodland listed on the AWI[4]	Within 1km of the Site.
Historic European Protected Species (EPS) licences granted	Within 2km of the Site.
Mapped waterbodies and watercourses	Within 500m of the Site.

[1] SAC, SPA and Ramsar sites.
[2] SSSI, LNR and National Nature Reserve (NNR).
[3] Local Wildlife Sites (LWS).
[4] The ancient woodland inventory in England lists areas over two hectares in size which have been continuously wooded since at least 1600.

Receptor	Zone of Influence (inclusive of the Site)
Habitats (all)	Within 50m of the Site.
Protected and notable species	Various (detailed in **Table 7-3**, below).
Trees (Arboriculture)	Within 15m of the Site.

DESK STUDY

7.4.5. A preliminary desk study is being completed for the Site and wider ZoI following best practice guidelines (**Ref 7.12- 7.17**). The desk study has included a review of publicly available resources and databases to determine the presence of protected sites, Habitats of Principal Importance (HPI) (as defined by the NERC Act 2006 (**Ref 7.7**)), ancient/veteran trees listed on the Ancient Tree Inventory (ATI[5]), and Tree Preservation Orders (TPOs) and woodland listed on the Ancient Woodland Inventory (AWI)[6]. The search radii are outlined in **Table 7-2**, above.

7.4.6. A full desk study will be completed with a request for biological records to be made to the Environmental Records Information Centre (ERIC) North East. In addition to the above, the search radius for records request will encompass:

- Records of protected and/or notable species within 2km of the Site; and
- ancient/veteran trees listed on the ATI, Conservation Areas and TPOs up to 15m from the Site.

7.4.7. Wetland Bird Survey (WeBS) data provided by the British Trust for Ornithology (BTO) has also provided count data for recent surveys (previous five years[7]) for birds within the following targeted WeBS survey 'sectors' within or adjacent to the Site:

- Dorman's Pool (part of RSPB Saltholme, enveloped by the Site);
- Reclamation Pond (within the Site); and
- Tees Estuary opposite Smiths Dock and Hargreaves Quarry.

7.4.8. Teesmouth Bird Club (TBC) will also be contacted to determine availability of supplementary survey data in relation to bird assemblages in areas surrounding the Site.

7.4.9. STBC have been contacted in May 2023 to confirm absence/presence of TPOs and Conservation Areas within the Arboriculture ZoI.

[5] The ATI is a database of ancient and veteran trees administered by the Woodland Trust and is not a definitive database for these receptors. Desktop study of this source is dated 16/06/2023.
[6] The AWI in England lists areas over two hectares in size which have been continuously wooded since at least 1600.
[7] The five most recent years in which data has been recorded.

FIELD SURVEY

7.4.10. Field surveys have commenced to gather data which will inform the terrestrial ecology assessment. Surveys are being, and will continue to be, completed in line with relevant current good practice guidelines. Where there are deviations from best practice, approaches to survey effort will be discussed with relevant consultees and survey methods and/or limitations detailed within the EIA.

7.4.11. **Table 7-3** below, details relevant survey buffers (ZoI) from the Site for the ecological receptors (habitats, species and species groups) mentioned above, along with relevant current good practice guidelines that have been used to determine the ZoI.

Table 7-3 - Receptor, Survey Buffer and Reference to Best Practice Guidelines

Receptor	Survey Buffer (ZoI) Beyond Site	Good Practice Guidelines Reference
Habitats	50m	UK Habitat Classification (UKHab) Working Group (2020a) (**Ref 7.18**) UKHab Working Group (2020b) (**Ref 7.19**) UKHab Working Group (2020c) (**Ref 7.20**) Rodwell (2006) (**Ref 7.21**)
Badger	30m	Harris et al. (1989) (**Ref 7.22**) Roper (2010) (**Ref 7.23**) Andrews (2013) (**Ref 7.24**)
Birds – breeding and wintering	500m (as agreed with Natural England)	Fuller (1980) (**Ref 7.25**) Bibby et al. (2000) (**Ref 7.26**) Gilbert et al. (1998) (**Ref 7.27**) Hardey et al. (2009) (**Ref 7.28**)
Otter	250m	Chanin (2003) (**Ref 7.29**)
Water Vole	250m	Strachan et al. (2011) (**Ref 7.30**) Dean et al. (2016) (**Ref 7.31**)
Reptiles	Site	Froglife (1999) (**Ref 7.32**) Gent and Gibson (2003) (**Ref 7.33**)
Amphibians	500m	Oldham et al. (2000) (**Ref 7.34**) English Nature (2001) (**Ref 7.35**)

Receptor	Survey Buffer (ZoI) Beyond Site	Good Practice Guidelines Reference
		Gent and Gibson (2003) (**Ref 7.33**) Amphibian and Reptile Groups of the United Kingdom (ARG UK) (2010) (**Ref 7.34**)
Trees (Arboriculture)	15m	BS 5837:2012 (**Ref 7.14**) Natural England/Forestry Commission (2022). (**Ref 7.15**)

7.4.12. Once completed, the surveys detailed in **Table 7-3** will define the requirements for any further surveys and assessment which may necessitate a revision of ZoI. The ZoI may also be subject to change as a result of refinement to the design of the Proposed Scheme and are therefore not necessarily fixed.

7.4.13. At the time of writing, wintering/breeding bird surveys have commenced, utilising a number of walked and driven transects as well as vantage points. UKHab habitats, reptile, otter and water vole surveys have also commenced. A great crested newt (GCN) *Triturus cristatus* Habitat Suitability Index (HSI) assessment has also been undertaken for a number of waterbodies within 500m of the Site. Access is pending for the remaining waterbodies. It is proposed to then undertake consultation with STBC to determine whether further survey effort for GCN is required. At the time of writing, arboricultural surveys have not commenced.

7.4.14. As a result of the findings of these surveys, the scope of the ecological impact assessment may require further refinement, and liaison with the relevant stakeholders and consultees will be undertaken as required.

7.5. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

7.5.1. The baseline conditions for the terrestrial ecology assessment have been (and are being) defined through a desk study and a series of field surveys. The following data sources have been (and will be) consulted to inform the baseline review:

- The Multi Agency Geographic Information for the Countryside (MAGIC) website[8];
- Ancient Woodland Inventory[9];
- Ancient Tree Inventory[10]
- Biological records received from ERIC North East;

[8] www.magic.defra.gov.uk
[9] https://naturalengland-defra.opendata.arcgis.com/datasets/ancient-woodland-england/explore
[10] https://ati.woodlandtrust.org.uk/tree-search

- Bird survey reports received from WeBS;
- Supplementary bird data from TBC; and
- A series of habitat and species-specific surveys.

7.5.2. As mentioned in **Section 7.1**, this assessment does not duplicate information set out in **Chapter 8: Marine and Freshwater Ecology**. Baseline information for the marine and freshwater ecology assessment can be found in the aforementioned chapter.

Designated Sites

7.5.3. The designated sites described within this section are shown on **Figure 2-2**.

Internationally Designated Sites

7.5.4. Internationally designated sites within the 10km of the Site and are detailed in **Table 7-4**, below.

Table 7-4 - Internationally Designated Sites within 10km of the Site

Designation	Approx. distance from Site	Summary of features for site designation
Teesmouth and Cleveland Coast SPA	Adjacent to the west	Wetlands of European importance, comprising a variety of habitats. These include intertidal sand and mudflats, rocky shore, saltmarsh, freshwater marsh, saline lagoons, sand dunes, and estuarine and coastal waters on and around the Tees Estuary. Avocet Recurvirostra avosetta; Common tern Sterna hirundo; Knot Calidris canutus; Little tern Sterna albifrons; Redshank Tringa totanus; Ruff Calidris pugnax; Sandwich tern Thalasseus sandvicensis, syn. Sterna sandvicensis; and Waterbird assemblage.
Teesmouth and Cleveland Coast Ramsar	Adjacent to the west	The Ramsar site has overlapping reasons for designation with the SPA and is designated for the following bird features: passage Redshank and Sandwich Tern, wintering Knot, and an overall significant wintering waterbird assemblage.

Nationally Designated Sites

7.5.5. Two nationally designated sites are located within 2km of the Site, as detailed in **Table 7-5**, below.

Table 7-5 - Nationally Designated Sites within 2km of the Site

Designation	Approx. distance from Site	Summary of features for site designation
Teesmouth and Cleveland Coast SSSI	Adjacent to the west	There are several 'units' designated as SSSI surrounding the Site, which each form part of the SPA. The nearest SSSI unit is located at Dorman's Pool (part of RSPB Saltholme), which is enveloped by the Site. The SSSI as a whole is of special interest for the following nationally important features that are present within and are supported by the wider mosaic of coastal and freshwater habitats: Sand dunes; Saltmarshes; Breeding harbour seals Phoca vitulina; Breeding Avocet, Little Tern and Common Tern; A diverse assemblage of breeding birds of sand dunes, saltmarsh and lowland open waters and their margins; Non-breeding Shelduck Tadorna tadorna, Shoveler Spatula clypeata, Gadwall Mareca strepera, Ringed Plover Charadrius hiaticula, Knot, Ruff, sanderling Calidris alba, Purple Sandpiper Calidris maritima, Redshank and Sandwich tern; An assemblage of more than 20,000 waterbirds during the non-breeding season; and A diverse assemblage of invertebrates associated with sand dunes.
Teesmouth National Nature Reserve (NNR)	970m to the north at its nearest point	Teesmouth NNR comprises a range of habitats, including sand dunes, grazing marsh, intertidal sand and mudflats. The area known as Seal Sands is one of the largest areas of intertidal mudflat on the north-east coast. Wildlife interest includes the presence of harbour seals and grey seals Halichoerus grypus. The harbour seals haul out on the sand banks at low tide, and pups are born here each summer. This makes Seal Sands the only regular breeding colony of these animals on the north-east coast. In addition, thousands of migratory waterbirds feed on the mudflats, including Redshank.

Local Statutory Designated Sites

7.5.6. There is one Local Nature Reserve (LNR) located within 2km of the Site. This is Berwick Hills LNR, located approximately 1.7km south of the Site.

7.5.7. The site is designated as an LNR partly due to the presence of a range of habitats of biodiversity value, including wildflower meadows, woodland, ponds, reedbeds, and running water in the form of Ormesby Beck. Habitats present are known to support a range of amphibians, and water vole are noted to be present.

Local Non-statutory Designated Sites

7.5.8. Details of the presence of any non-statutory designated sites within 1km of the Site will be included in the biological records data requested from ERIC North East. These records will be reviewed to determine the number and proximity of any non-statutory sites within or surrounding the Site.

Habitats

Habitats of Principal Importance

7.5.9. There are a number of HPIs located within 1km of the Site, as detailed in **Table 7-6**:

Table 7-6 - HPIs within 1km of the Site

Designation	Approx. distance from Site	Comments
Open Mosaic Habitat (OMH) on Previously Developed Land	Within and adjacent	A proportion of the Site and surrounding area is designated as OMH. However, this is noted on MAGIC as "probably the priority habitat but some uncertainty of interpretation," and the reliability of the habitat interpretation is considered to be low, although this remains an unknown at the present time.
Coastal and Floodplain Grazing Marsh (CFGM)	Within and adjacent	Extensive areas of CFGM are present within 1km of the Site, mainly to the west within RSPB Saltholme, with a small proportion of this habitat also located within the Site itself.
Mudflats	Adjacent	Several areas of Mudflat are located along the River Tees adjacent to the Site.
Deciduous Woodland	80m to the east at its nearest point	Several areas of Deciduous Woodland are present within 1km of the Site, but none within the Site itself.
Saline Lagoons	110m to the west	An area of Saline Lagoon is present within RSPB Saltholme to the west of the Site.

'No main habitat but additional habitats present'	405m to the west at its nearest point	There are several areas highlighted on MAGIC as 'no main habitat but additional habitats present'. These include an area noted to have Reedbed present approximately 405m to the west of the Site and an area with CFGM approximately 510m to the west.

Ancient Woodland

7.5.10. No Ancient Woodland is present within 1km of the Site, according to the AWI.

Ancient/Veteran Trees

7.5.11. No Ancient or Veteran trees are present within 15m of the Site, according to the ATI.

TPOs and Conservation Areas

7.5.12. Correspondence from STBC, dated 14 June 2023, confirms the absence of TPOs and Conservation Areas within 15m of the Site.

Other Habitats

7.5.13. Areas of vegetation within the Site appear to predominantly comprise grassland and scrub. Whilst some of these areas are isolated, being surrounded by the predominant industrial land in the area, some areas are more extensive and have some connectivity to wider areas of similar habitat. The vegetation present could offer suitable habitat for a range of species, including badger *Meles meles*, birds, reptiles, and amphibians.

7.5.14. Areas to the north, east and south beyond the Site predominantly comprise further industrial land, interspersed with grassland and scrub. An active landfill site is also present adjacent to the south and west of the Site, with the River Tees beyond. Wetland areas comprising the RSPB Saltholme reserve are present outside the Site to the west, but are enveloped by the Site in one location, around the waterbody known as Dorman's Pool (see below for further detail).

7.5.15. In general, the various industrial facilities and associated access roads both within and surrounding the Site have been assessed at a high level to be of low or negligible ecological value. This is based on a review of available imagery using Google Earth and Google Street View, the types of land uses found to be present, and professional judgement in relation to these types of habitat. The types of habitat present, including active industrial buildings, car parking areas and access roads, typically offer limited biodiversity value. This is due to them being regularly disturbed, artificial habitats that do not offer the typical requirements for most UK wildlife to shelter, forage or breed. This assessment will be verified or modified as necessary, during field surveys being undertaken.

7.5.16. Land uses within or around the Site which are more likely to have biodiversity value and have the potential to influence the scope of the assessment include:

- areas of industrial land within the Site that appear to be subject to little disturbance;
- areas of vegetation both within and surrounding the Site; and
- RSPB Saltholme, located directly adjacent to the Site.

7.5.17. Areas of industrial land are present in the north of the Site, to the north of the TV1 and TV2 facilities, which do not contain any active industrial facilities and appear to be subject to relatively little disturbance by human activity. These areas may contain microhabitats that are of high biodiversity value and include notable plant and invertebrate assemblages.

7.5.18. RSPB Saltholme is a reserve comprising a series of waterbodies and surrounding wetland habitat. It is designated due to its use by significant numbers of birds during both the breeding, passage and overwintering periods. RSPB Saltholme and other areas surrounding the Site have several overlapping statutory designations (discussed in more detail below) and are known to be of national and international importance for bird populations. The habitats present also offer suitability for other wildlife, including otter Lutra lutra, water vole Arvicola amphibius, badger, reptiles and potentially amphibians.

Protected/Notable Species

7.5.19. Details of the presence of any protected and/or notable species of wildlife within 2km of the Site will be included in the biological records data requested from ERIC North East. These records will be reviewed to determine the presence or protected or notable species (for example bats, badger, birds, otter, water vole, reptiles and amphibians) within or surrounding the Site. Details of the full desk study findings will be included within the PEA. Protected species surveys are being undertaken as part of the overall assessment and will be detailed in full within the Preliminary Ecological Appraisal (PEA). The results will be presented and discussed further in the Preliminary Environmental Information Report (PEIR).

7.5.20. The below list of sensitive receptors is subject to change and may be expanded upon once survey work has been able to be completed and detailed information gathered about the presence and extent of any protected or notable species and habitats. Full details will be confirmed in the PEA.

7.5.21. The following protected/notable species information is currently known:

Bats

7.5.22. One EPS mitigation licence has been granted within 2km of the Site, according to the information available on MAGIC. This pertains to the destruction of a common pipistrelle Pipistrellus pipistrellus bat roost (non-maternity), located approximately 520m from the Site.

WeBS Records

7.5.23. The WeBS data obtained for Dorman's Pool, Reclamation Pond and the Tees Estuary opposite Smiths Dock and Hargreaves Quarry has been reviewed. In brief, there are records of numerous bird species (both breeding and overwintering) within these survey sectors. This includes records of the notable/qualifying features of the Teesmouth and Cleveland Coast SSSI/SPA/Ramsar.

7.5.24. Although breeding and overwintering bird surveys are being undertaken as part of the overall assessment scope, these existing records will be used to supplement the findings of the surveys and help determine likely significant effect to bird populations present within and adjacent to the Site.

FUTURE BASELINE

7.5.25. Climate change and flood risk (described in detail in **Chapter 9: Water Environment and Flood Risk** and **Chapter 13: Climate Change Resilience**) may result in a change of habitat type over time. Areas more likely to flood, including designated sites, may change to habitats typical of wetter environments such as wetlands and marshes.

7.5.26. Invasive species can colonise quickly where previously absent.

7.5.27. Any decommissioning and demolition activities for the existing TV1 and TV2 sites are anticipated to have negligible impact on ecological receptors within the footprints of the sites themselves. This is due to the sites currently comprising regularly disturbed, artificial habitats that appear to be negligible biodiversity value from a high-level assessment. Any demolition works would be expected to be temporary, short term and localised in duration. Furthermore, demolition works would be required to be subject to appropriate mitigation measures, likely including measures outlined in a Noise Management Plan and Dust Management Plan. Therefore, this would limit the potential for significant disturbance impacts to surrounding ecological receptors. These measures have already been requested from Natural England during discussions relating to the demolition of the TV1 and TV2 facilities.

7.6. SENSITIVE RECEPTORS

7.6.1. A summary of sensitive receptors that are reasonably foreseeable at this stage is provided in **Table 7-7**:

Table 7-7 - Summary of Sensitive Receptors

Receptor type	Specific receptor	Location relative to the Proposed Scheme
Internationally designated site	Teesmouth and Cleveland Coast SPA	Adjacent to the Site

Receptor type	Specific receptor	Location relative to the Proposed Scheme
	Teesmouth and Cleveland Coast Ramsar	Adjacent to the Site
Nationally designated site	Teesmouth and Cleveland Coast SSSI	Adjacent to the Site
	Teesmouth NNR	970m north
Locally designated site (statutory)	Berwick Hills LNR	1.7km south
HPI	OMH	Within and adjacent
	Coastal and Floodplain Grazing Marsh (CFGM)	Within and adjacent
	Mudflats	Adjacent
	Deciduous Woodland	80m east
	Saline Lagoons	110m west
	'No main habitat but additional habitats present'	405m west
Protected/notable species	A range of species, including badger, birds (breeding and wintering), otter, water vole, reptiles, and amphibians	Within and adjacent. A range of breeding and overwintering birds are known to be present within and adjacent to the Site, based on the WeBS data provided. The presence of other protected/notable species will be determined upon review of the biological records provided by ERIC North East and from surveys due to be completed.

7.6.2. Whilst the information presented in this section so far has been as detailed as reasonably practicable, it should be noted that the terrestrial ecology assessment is an iterative process. Therefore, as noted above, subject to the results of surveys to be completed, the quantity and extent of sensitive receptors may be subject to change.

7.7. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

OVERVIEW

7.7.1. This section discusses design, mitigation and enhancement measures relevant to terrestrial ecology receptors only. Measures relating to marine and freshwater ecological receptors are discussed in **Chapter 8: Marine and Freshwater Ecology**.

7.7.2. Avoidance and mitigation measures will be developed throughout the design process of the Proposed Scheme. It is envisaged that, where possible, any habitats of biodiversity value will be retained as part of the Proposed Scheme, with enhancement measures provided alongside these. Where this is not possible, compensation measures will be explored.

7.7.3. Based on the results of surveys and assessments to be completed, mitigation measures leading to the avoidance, reduction or compensation of significant effects will be identified prior to an evaluation of the effects of impacts. This will constitute 'embedded' mitigation within the Proposed Scheme design. Such mitigation measures will be included as part of the ES.

7.7.4. Thereafter, any residual impacts identified following the implementation of embedded mitigation measures will be identified. Monitoring requirements will also be explored, and requirements determined once full survey results have been interpreted and full Proposed Scheme details are known. Any such requirements for mitigation and/or monitoring will be captured within a Code of Construction Practice (CoCP) bespoke to the Proposed Scheme.

7.7.5. With regard to habitat compensation and enhancement, the principles of Biodiversity Net Gain (BNG) will be applied and a BNG assessment undertaken. The target net gain % for the Proposed Scheme will be discussed and agreed as part of the pre-application process. This is discussed further in **Section 7.9** below.

CONSTRUCTION PHASE

7.7.6. Mitigation measures during the construction phase are likely to include:

- production of a CoCP, detailing standard best practice measures to be incorporated into construction, including:
    - best practice measures for pollution prevention to minimise impacts on surrounding habitats (including water quality), such as the creation of suitable of drainage and use of silt fences, where necessary;
    - employment of noise reduction measures on operational plant machinery and equipment;
    - dust suppression measures; and
    - Use of sensitive lighting where any night works are required;
- use of appropriate buffer zones to avoid direct impacts e.g. to trees or significant disturbance to wildlife and their habitats, e.g. any active badger setts;

- precautionary vegetation clearance, where necessary, to avoid significant impacts to species such as reptiles;
- timing of works to avoid sensitive periods for certain species, e.g. avoiding clearance of suitable bird nesting habitat during nesting season;
- retention of habitats of high biodiversity value; and
- potential need for habitat creation and replacement (to be confirmed as the field surveys progress).

OPERATION PHASE

7.7.7. Mitigation measures during the operation phase are likely to include:

- appropriate design of the Proposed Scheme to minimise air quality and noise impacts on surrounding habitats, including statutory designated sites;
- appropriate design of the Proposed Scheme to minimise water quality impacts on surrounding habitats, including waterbodies within RSPB Saltholme and the River Tees; and
- a sensitive lighting scheme for any permanent lighting to be installed as part of the Proposed Scheme.

DECOMMISSION PHASE

7.7.8. Mitigation measures during the decommission phase are expected to be comparable to those for the construction phase and would be document and secured by a decommission plan.

7.8. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

7.8.1. Although certain elements of the terrestrial ecology assessment have already commenced at the time of writing, at this point it is not possible to accurately determine likely significant effects to the various receptors that may be impacted. As such, and on a precautionary basis, receptors have been scoped into the assessment unless there is sufficient desk study information to suggest that they are highly unlikely to be affected by the Proposed Scheme and/or appropriate mitigation measures can be confidently determined at this early stage.

CONSTRUCTION PHASE

7.8.2. The construction phase will include site clearance and groundworks (enabling works), followed by construction activities themselves. These works have the potential for both short-term and permanent impacts, both direct and indirect, to habitats both within the Site and on surrounding areas. Direct impacts will include temporary or permanent loss of habitat and potential killing or injury of any protected or notable species present.

7.8.3. Disturbance impacts may be both direct and indirect and could include those from light spill, noise, vibration, visual disturbance, air pollution (such as dust deposition

and pollution from traffic movements) and water pollution (such as from run-off of chemicals). This may negatively impact upon habitats and species through direct or indirect disturbance and/or result in habitat degradation in surrounding areas, including nearby designated sites.

7.8.4. Where appropriate, impacts will be assessed in detail across other chapters of the ES (such as the ES **Chapter 6: Air Quality**, ES **Chapter 9: Marine and Freshwater Ecology** and ES **Chapter 10: Water Environment and Flood Risk**) and cross-referenced in the ES **Chapter 8: Terrestrial Ecology**. Impacts will be assessed both in consideration of the Proposed Scheme alone and in combination with any other surrounding developments.

OPERATION PHASE

7.8.5. Due to the nature of processes in the operational phase of the Proposed Scheme, direct impacts to ecological receptors are considered unlikely. However, indirect impacts may be incurred, again through light spill, noise, vibration, visual disturbance (such as from gas flares), air pollution (during operation of the SAF plant and pollution from traffic movements) and water pollution (such as from discharge of chemicals).

7.8.6. Operational impacts for the Proposed Scheme have not yet been defined, and although unlikely, due to the limited information available, it has had to be assumed that likely significant effects would occur. Operational impacts associated with lighting, noise, vibration and visual disturbance, may negatively impact upon habitats and species through indirect disturbance.

7.8.7. In addition, air and water emissions resulting from the operation of the SAF plant may result in habitat degradation in surrounding areas, including nearby designated sites. However, measures intended to avoid or reduce these impacts are expected to be embedded into the design of the Proposed Scheme. The SAF facility will be subject an environmental permit which would strictly regulate air and water emissions. The Proposed Scheme will also include its own wastewater treatment facilities to clean (and re-use as far as practicable) process water, with effluent being discharged to the nearby Bran Sands wastewater treatment facility.

DECOMMISSIONING PHASE

7.8.8. The decommissioning phase will include site clearance. These works have the potential for both short-term and permanent impacts, both direct and indirect, to habitats within the Site and on surrounding areas. Direct impacts may include temporary or permanent loss of habitat and potential killing or injury of any protected or notable species present.

7.8.9. Disturbance impacts may be both direct and indirect and could include those from light spill, noise, vibration, visual disturbance, air pollution (such as dust deposition and pollution from traffic movements) and water pollution (such as from run-off of chemicals). This may negatively impact upon habitats and species through direct or

indirect disturbance and/or result in habitat degradation in surrounding areas, including nearby designated sites.

ELEMENTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

7.8.10. **Table 7-8** details those receptors/features to scoped in or out of the terrestrial ecology assessment. Each receptor/feature is accompanied by a justification for its inclusion or exclusion from further assessment.

Table 7-8 - Elements Scoped in or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Statutory designated sites – international	Construction, operation and decommissioning	✔		Habitats within the Teesmouth and Cleveland Coast SPA and Ramsar may be affected via air and water pollution events during both construction and operation. In addition, the qualifying bird species may be disturbed via noise, vibration, lighting and/or visual disturbance during construction and operation.
Statutory designated sites – national	Construction, operation and decommissioning	✔		Habitats within the Teesmouth and Cleveland Coast SSSI (including Dorman's Pool, adjacent to the SAF Plant Site) and Teesmouth NNR may be affected via air and water pollution events during both construction and operation. In addition, notable species of wildlife associated with these designations may be disturbed via noise, vibration, lighting and/or visual disturbance during construction and operation.
Statutory designated sites – local	Construction, operation and decommissioning		✔	Although Berwick Hills LNR is located within the ZoI for local statutory designated sites, it is on the opposite side of the River Tees to the Proposed Scheme. The river would constitute a barrier to dispersal for most species of terrestrial wildlife that may be present within the LNR, resulting in a lack of connectivity between the LNR and the Proposed Scheme. In addition, the LNR is located at such a distance from the Proposed Scheme that adverse effects from noise, vibration, lighting or visual disturbance are expected to be negligible.

Element	Phase	Scoped In	Scoped Out	Justification
Non-statutory designated sites	Construction, operation and decommissioning	✔		No data has currently been received for non-statutory designated sites therefore these have been scoped in. To be assessed once the biological records provided by ERIC North East have been reviewed.
Habitats of conservation importance	Construction, operation and decommissioning	✔		Much of the Site is designated as OMH, along with adjacent areas. The results of the habitat survey carried out as part of the assessment will be used to determine the presence or absence of this habitat, with likely significant effects then determined. If OMH habitat is present, site clearance and construction activities associated with the Proposed Scheme will result in the loss of this habitat. In addition, activities during the operation of the Proposed Scheme may lead to the degradation of any adjacent OMH present as a result of dust deposition or pollution events. As above, HPI that are present within the Site may incur some habitat loss resulting from site clearance activities during the construction phase, depending on the extent of clearance required. In addition, HPI adjacent to the Site may incur adverse effects during both construction and operation via dust deposition and pollution events.
Badger	Construction, operation and decommissioning	✔		There are habitats within and adjacent to the Site that are suitable to support badger. The potential therefore exists for direct physical impacts to badger (e.g. loss of badger setts) as well as indirect impacts (e.g. vibration or noise disturbance) to resident badger during construction.

Element	Phase	Scoped In	Scoped Out	Justification
				Potential indirect effects (e.g. light spill, noise and disturbance) may have an impact upon badger during operation of the Proposed Scheme.
Bats	Construction, operation and decommissioning		✔	Buildings present within and adjacent to the Proposed Scheme predominantly comprise industrial buildings that are regularly disturbed, being in active use, and are typically of a construction type that would not offer obvious roosting suitability for bats. It is also expected that the majority of buildings currently present within the Site will be retained or remain unaffected as part of the Proposed Scheme. Structures within the TV1 and TV2 sites will be demolished as part of the Proposed Scheme. However, an assessment of these structures during elements of the habitat survey that have been able to be completed so far did not highlight any suitability for roosting bats. Although there are some suitable areas beyond the Site that may offer commuting and foraging habitat for bats, these are also not expected to be directly affected by the Proposed Scheme. Habitats within the Site itself typically appear to be of limited value for bats, with a lack of trees or hedgerows present. Based on the above, standard mitigation measures can be incorporated into Proposed Scheme in relation to potential indirect disturbance impacts (such as light spill) to minimise impacts to foraging and commuting. It is therefore considered that bats can be scoped out of the assessment at this stage.

Element	Phase	Scoped In	Scoped Out	Justification
Birds	Construction, operation and decommissioning	✔		There are some habitats within and adjacent to the Site, including Reclamation Pond and areas of grassland and scrub, that could offer suitable nesting and overwintering habitat for a range of bird species. Furthermore, the Teesmouth and Cleveland Coast SSSI/SPA/Ramsar is located directly adjacent to the Site. Site clearance and construction could result in direct loss of nesting and/or overwintering habitat, including the potential killing or injury of nesting birds. In addition, disturbance could be incurred as a result of noise, vibration and visual impacts during construction and operation.
Amphibians	Construction, operation and decommissioning	✔		Grassland and scrub habitats within the Site offer suitable shelter and foraging habitat for amphibian species, including GCN and common toad Bufo bufo. In addition, there are a number of waterbodies in the areas surrounding the Site. Some of these waterbodies may offer suitable breeding habitat for amphibians. Any clearance of suitable habitat required during the construction phase may result in habitat loss and direct killing or injury of amphibians. In addition, indirect impacts may be incurred during both construction and operation via dust deposition and pollution events, resulting in habitat degradation.
Reptiles	Construction	✔		The grassland and scrub present within the Site offer suitable shelter and foraging habitat for reptiles. Any clearance of these habitats during the construction

Element	Phase	Scoped In	Scoped Out	Justification
				phase may result in the direct killing or injury of reptiles.
Otter	Construction, operation and decommissioning	✔		There are a number of watercourses and waterbodies located within and adjacent to the Site that could support otter. Activities during the construction phase may result in adverse effects to suitable otter habitat and disturbance to otter themselves via pollution events, noise, vibration and lighting disturbance. Lighting and visual disturbance may negatively affect otter during operation of the Proposed Scheme.
Water vole	Construction, operation and decommissioning	✔		There are a number of watercourses and waterbodies located within and adjacent to the Site that could support water vole. Activities during the construction phase may result in adverse effects to suitable water vole habitat and disturbance to water vole themselves via pollution events, noise, vibration and lighting disturbance. Lighting and visual disturbance may negatively affect water vole during operation of the Proposed Scheme.
Terrestrial invertebrates	Construction, operation and decommissioning	✔		Based on available aerial imagery and the extent of survey effort completed to date, habitats within the Site are considered unlikely to support notable invertebrate assemblages. This is due to large areas of site appearing to be subject to ongoing disturbance by human activity and generally lacking

Element	Phase	Scoped In	Scoped Out	Justification
				suitable invertebrate habitat, but this conclusion has been partly drawn from a high-level assessment. Some areas of the Site that are yet to be surveyed are designated on MAGIC as OMH and, therefore, may still offer some suitable invertebrate habitat. The Teesmouth and Cleveland Coast SSSI is partly designated as such for the presence of a notable invertebrate assemblage utilising the various habitats present. There are not expected to be any direct adverse effects to the SSSI as a result of the Proposed Scheme, and it is considered that appropriate mitigation can be incorporated into both the construction and operation phases (such as pollution prevention measures) to avoid significant adverse indirect effects. However, as the SSSI is located directly adjacent to parts of the Site, any suitable habitat that is revealed to be present during further survey effort to be completed could potentially be considered to be 'functionally linked' to the SSSI. On the basis of the above, terrestrial invertebrates are scoped into the assessment.
Trees (Arboriculture)	Construction	✔		Scoped in on a precautionary basis in the absence of an arboricultural walkover survey, to confirm the presence or absence of significant trees. Scoping survey to be undertaken. Elements of the Proposed Scheme could result in impacts to trees at construction phase. Potential impacts include tree removal or adverse indirect

Element	Phase	Scoped In	Scoped Out	Justification
				impacts to retained trees in proximity to the Proposed Scheme. Subject to arboricultural surveys, standard mitigation measures can be incorporated into the Proposed Scheme to minimise arboricultural impacts i.e., principles of avoidance and implementation of a CoCP.

7.9. PROPOSED ASSESSMENT METHODOLOGY

7.9.1. The assessment methodology is common across all elements of the Proposed Scheme and will be undertaken in accordance with the CIEEM EcIA guidelines (**Ref 7.11**). These guidelines represent the current best practice for assessing the ecological impact of development projects. Other industry best practice guidance that will be followed when undertaking the assessment is referenced in **Section 7.3** and **Section 7.4**.

7.9.2. Consideration will also be given to standard EIA terminology, where the significance level attributed to each effect has been assessed based on the sensitivity of the affected IEFs and the magnitude of change arising from the Proposed Scheme, as well as a number of other factors that are outlined in (as presented in **Chapter 3: Approach to EIA**). The sensitivity of the affected receptor is assessed on a scale of very high, high, medium, low, and negligible (as summarised in **Table 7-9**), and the magnitude of change is assessed on a scale of large, medium, small, negligible and no change.

7.9.3. The assessment of likely significant environmental effects as a result of the Proposed Scheme will consider both the construction and operational phases. The impact process involves:

- identifying and characterising impacts and their effects;
- incorporating measures to avoid and mitigate adverse effects;
- assessing the significance of any residual effects after embedded mitigation;
- identifying appropriate additional mitigation measures and any compensation measures to offset significant residual effects; and
- identifying opportunities for ecological enhancement.

7.9.4. This assessment will be presented in the form of and ES chapter and adjacent assessments, including an HRA and BNG assessment.

7.9.5. The assessment includes potential impacts on each receptor identified as an Important Ecological Feature (IEF, discussed further under ‘Determining Importance’, below), identifying potential impacts and effects during the construction and operational phases of the project, with impacts and effects characterised in accordance with the following criteria:

- Positive or negative – whether the impact/effect will improve or reduce the quality of the baseline habitat present;
- Extent – the spatial or geographical area over which the impact/effect may occur,
- Magnitude – the size, amount, intensity or volume of the impact/effect, defined on a quantifiable basis, such as an area or percentage of habitat to be lost;

- Duration – the length of time an impact/effect is expected to last, relative to the particular timeframe for the species/habitat being considered and defined in **Chapter 3: Approach to EIA** as short, medium or long-term and permanent or temporary. Short- term is considered to be up to one year; medium-term is considered to be between one and 10 years and long-term is considered to be greater than 10 years;
- Frequency and timing – the frequency of a particular activity may change its impact/effect, e.g., one-off or infrequent disturbance is less likely significantly affect a particular species present within a habitat, whereas regular disturbance is more likely to have a significant effect. Similarly, the impact/effect of a particular activity may change significantly depending on its timing, e.g., tree felling outside of bird nesting season is highly unlikely to directly impact nesting birds, whereas carrying out the same work within nesting season is more likely to have impacts; and
- Reversibility – an irreversible (permanent) effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it. A reversible (temporary) effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation.

DETERMINING IMPORTANCE

7.9.6. A number of characteristics contribute to the importance of ecological features. These include, for example (but not exclusively):

- the rarity of a species or habitat;
- legal protection/conservation status;
- ability to resist or recover form environmental change;
- whether the species population size is notable in a wider context;
- the richness of assemblages of plants and animals; and
- the presence of species on the edge of their range, particularly where their distribution is changing as a result of global trends and climate change.

7.9.7. The CIEEM guidelines (**Ref 7.11**) state that ecological features should be considered within a ‘defined geographical context’ (i.e. spatial scale), with International importance being the highest level, followed by International and European; National; Regional; Metropolitan, County, vice-county or other local authority-wide areas; River Basin District; Estuarine system/Coastal cell; and Local importance representing the lowest level.

7.9.8. Assigning importance to ecological features is based on professional judgement informed by available guidance and information and expert advice.

7.9.9. **Table 7-9** below, gives an example classification and sensitivity of ecological features. The level of sensitivity assigned to an IEF is related to its level of importance (on a

geographic scale) taking into consideration the various factors listed in **paragraph 7.9.9**.

Table 7-9 - Example Classification of Important Ecological Features

Importance	Sensitivity	Criteria Examples
International	Very High	An internationally designated site (e.g., SAC, SPA), or site meeting criteria for international designation.
		Species present in internationally important numbers (>1% of biogeographic population)
National (England/UK)	High	A nationally designated site (SSSI or National Nature Reserve), or sites meeting the criteria for national designation
		Species present in nationally important numbers (>1% of UK population)
		Viable areas of priority habitat listed on Annex I of the Habitats Directive and smaller areas of such habitat that is essential to maintain the viability of that ecological resource
Regional (north-east)	Medium	Regionally significant and viable areas of key habitat identified as being of regional value
		Species present in regionally important numbers (e.g., >1% of the UK population), and regionally important populations of a species
County/Borough (Stockton-on-Tees)	Medium	Local Nature Reserves
		Habitat areas identified as being important at the county scale (for example those identified by the Tees Valley Nature Partnership (related to previous Local Biodiversity Action Plan Habitats)
		Species present in populations considered to be important at the county scale (for example those identified by the Tees Valley Nature Partnership (related to previous Local Biodiversity Action Plan Habitats)
District	Low	Non-statutory designated sites, e.g., Wildlife Sites (LWS) (depending on circumstances)
		Habitats considered to be important at the district level, and populations of a species considered to be important at the district level

Importance	Sensitivity	Criteria Examples
Local (surrounding areas)	Low	Non-statutory designated sites, e.g., Wildlife Sites (LWS) (depending on circumstances)
		Areas of ancient semi-natural woodland less than 0.25ha in size
		Areas of habitat or species considered to appreciably enrich the ecological resource within a local context, e.g., species-rich flushes or hedgerows
Site	Negligible	Usually widespread and common habitats and species

SIGNIFICANCE OF EFFECT CRITERIA

7.9.10. The CIEEM guidelines define a significant effect in the context of an ecological impact assessment as "an effect that either supports or undermines biodiversity conservation objectives for important ecological features or for biodiversity in general". Significant effects, as defined by the CIEEM guidelines, are determined by assessing any deviation in the baseline conditions of a feature of ecological importance that may occur as a result of individual and cumulative impacts during the construction and operational phases of the Proposed Scheme. These effects will be expressed in terms of geographical scale (as outlined in **Table 7-9**); however, the geographical scale at which an effect is significant can vary from the geographical importance of the ecological feature being assessed. In accordance with the CIEEM guidelines, this will be a function of the assessment.

7.9.11. Effects will be defined as either 'significant' or 'not significant'. The terrestrial ecology assessment will use the CIEEM methodology to describe all significant effects on features of ecological importance.

7.9.12. Significant effects will be determined through professional judgement and significance will be concluded as either 'Negligible', 'Minor', 'Moderate' or 'Major', as outlined in **Table 7-10**, below. For each IEF, the significance would also be determined as either 'beneficial' or 'adverse'.

Table 7-10 - Scale and Significance of Residual Effects

Geographic scale of significance in line with the CIEEM guidelines	Category of significant effect
International, European, National or Regional	Major – where the Proposed Scheme is likely to cause a considerable change from the baseline conditions and the receptor has limited adaptability, tolerance or recoverability or is of the highest sensitivity.

Geographic scale of significance in line with the CIEEM guidelines	Category of significant effect
Regional, Metropolitan, County, Vice-county, or other Local Authority-wide area, River Basin District, Estuarine system/Coastal cell	Moderate – where the Proposed Scheme is likely to cause either a considerable change from the baseline conditions at a receptor which has a degree of adaptability, tolerance or recoverability or a less than considerable change at a receptor that has limited adaptability, tolerance or recoverability.
Local	Minor – where the Proposed Scheme is likely to cause a small but noticeable change from the baseline conditions on a receptor which has limited adaptability, tolerance or recoverability, or is of the highest sensitivity or a considerable change from the baseline conditions at a receptor which can adapt, is tolerant of the change or/and can recover from the change.
Effects on features of Site-scale importance or limited effects on features of greater importance. No significant effects on key nature conservation features	Neutral/Negligible – no perceptible change

7.9.13. As set out in **Chapter 3: Approach to EIA**, effects that are classified as **Moderate** or **Major** are considered significant. Effects classified as below **Minor** or **Neutral/Negligible** are considered not significant.

OTHER ASSESSMENTS

Habitats Regulations Assessment

7.9.14. As the Site is located directly adjacent to the Teesmouth and Cleveland Coast SPA, there is considered to be the potential for likely significant effects on the ecological receptors that constitute the 'qualifying features' of these sites. As such, a Habitats Regulations Assessment (HRA) screening exercise will need to be undertaken to determine any likely significant effects resulting from the Proposed Scheme during either the construction or operational phases. HRA screening will be completed when sufficient environmental information has been gathered to accurately determined likely significant effects. Alongside the terrestrial ecology assessment, this will include information from the freshwater and marine ecology assessment, air quality assessment, and water environment assessment. It is expected that this information will be available following production of the PEIR.

7.9.15. If likely significant effects are identified (which is expected to be the case, as alluded to in **Section 7.8**), an Appropriate Assessment will then need to be carried out to examine these effects in more detail and determine appropriate mitigation measures in order to avoid any adverse effects on site integrity resulting from the Proposed Scheme.

7.9.16. In addition, although it doesn't specifically require assessment under the Habitats Regulations, due to the overlap in qualifying features and geographic coverage, the Teesmouth and Cleveland Coast Ramsar site will also be considered as part of the HRA.

7.9.17. Further details on the HRA process are provided in **Chapter 3: Approach to EIA**.

Biodiversity Net Gain Assessment

7.9.18. To determine the biodiversity value of the Site pre and post-development in a quantitative way, a BNG assessment will also be undertaken.

7.9.19. BNG is the end result of a process applied to development so that, overall, there is a positive outcome for biodiversity. This process follows the mitigation hierarchy, which sets out that everything possible must be done to firstly avoid, secondly minimise and thirdly restore/rehabilitate losses of biodiversity on a site. Only as a last resort, residual losses are compensated for, contributing towards local and national policies and strategies for conserving and enhancing biodiversity.

7.9.20. The BNG assessment will be based upon achieving compliance with current good practice principles, including measures such as avoiding areas of higher ecological value and achieving a measurable gain for biodiversity. Measurable gains will be calculated using the Defra Biodiversity Metric tool. At the time of writing, a Habitat Condition Assessment (HCA) has commenced on Site as part of the UKHab survey effort to help inform the BNG assessment. The HCA has been undertaken using criteria relevant to Biodiversity Metric 4.0 (**Ref 7.37**). Therefore, this data will be carried through the assessment and the Biodiversity Metric 4.0 will be used to complete the BNG assessment.

7.9.21. 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. BNG is not mandatory under the Environment Act 2021 (**Ref 7.10**) for Nationally Significant Infrastructure Projects (NSIPs) until 2025. Therefore, the target net gain % for the Proposed Scheme will be discussed and agreed as part of the pre-application process.

7.9.22. The BNG assessment is also discussed in **Chapter 3: Approach to EIA**.

Further Surveys

7.9.23. As mentioned previously above, the Study Area for the terrestrial ecology assessment and the receptors present have been identified as far as reasonably foreseeable at this stage, based on available information. However, as the assessment progresses and initial survey work is completed, the findings may reveal the need for further surveys to determine potential likely significant effects to ecological receptors more accurately. Any further survey requirements would be clearly highlighted following the completion

of initial survey work. Further information on proposed surveys and methodology can be found in **Appendix 7-A: Interim Ecological Information Report**.

Licensing

7.9.24. The findings of the surveys being completed as part of the terrestrial ecology assessment may determine that there are likely significant effects to certain species or species groups that will result from the Proposed Scheme. In some instances (such as in relation to badger, otter, water vole or great crested newt), potential impacts to these species may not be legally permissible without first obtaining a mitigation licence from Natural England. Any requirements for licensing would be clearly set out in the various survey reports to be produced, and licences would be applied for and obtained prior to any works being undertaken that would affect the relevant species. The requirements for any protected species licensing would also be captured within the ES.

7.10. LIMITATIONS AND ASSUMPTIONS

7.10.1. This Scoping Report is based on information available at the time of writing. Information on the Site and wider ZoI, as well as the design of the Proposed Scheme, is therefore subject to change.

7.10.2. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- Where access restrictions within the Study Area prevent a full ecological baseline assessment, a precautionary principle will be applied to the assessment (and has been to the scoping assessment) of any important ecological features. The precautionary principle will assume a ‘reasonable worst-case’ scenario informed by professional experience and knowledge, desk-based information and field-based evidence (where available) for any feature/receptor unable to be accessed or fully surveyed. This approach will ensure that appropriate recommendations and/or mitigation are provided even though these may not later be required. Any recommendation/mitigation can thereafter be amended accordingly once access/survey has been possible.
- A detailed scope for the assessment has been provided as far as feasible at this stage. However, as mentioned above, the scope may be subject to change as a result of the ongoing assessment and/or any forthcoming details relating to the Proposed Scheme. This may require additional survey effort and/or assessments to be completed in order to accurately determine likely significant effects resulting from the Proposed Scheme.
- Records held by local biological record centres and local recording groups are generally collected on a voluntary basis; therefore, the absence of records does not demonstrate the absence of species, it may simply indicate a gap in recording coverage.

- Ecological survey data is typically valid for two years unless otherwise specified, for example if conditions are likely to change more quickly due to ecological processes or anticipated changes in management (**Ref 7.38**). Any delays to completion of the scope of surveys outlined above may therefore require update surveys to be completed to ensure that any findings presented as part of the EIA are valid.
- The scope included within this chapter does not include marine and freshwater ecology. This is detailed separately in **Chapter 8: Marine and Freshwater Ecology**.

7.11. REFERENCES

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8. MARINE AND FRESHWATER ECOLOGY

8.1. INTRODUCTION

8.1.1. This chapter considers the impacts of the Proposed Scheme on freshwater and marine biodiversity receptors during the construction and operational phases of the project, and any potential likely significant effects. It sets out the proposed methodology for the freshwater and marine biodiversity assessment and identifies those impacts that can be scoped out of the assessment. Where necessary, further assessment will be presented in the ES.

8.1.2. This Chapter is intended to be read as part of the whole EIA scoping Report, including with reference to:

- **Chapter 7: Terrestrial Ecology; and**
- **Chapter 9: Water Environment and Flood Risk.**

8.1.3. In addition, **Figure 2-2** illustrates statutory ecological designations and ecological habitats.

8.2. CONSULTATION

8.2.1. A consultation meeting has previously taken place with Natural England on 08 June 2023 via their Discretionary Advice Service (DAS) to discuss certain aspects of the marine and freshwater ecology assessment and help refine the EIA scope.

8.3. POLICY, LEGISLATION AND GUIDANCE

8.3.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is as summarised in **Table 8-1**:

Table 8-1 – Marine and Freshwater Ecology - Summary of key Policy, Legislation and Guidance

Policy/Legislation/Guidance	Description
Policy	
The Overarching National Policy Statement for Energy (NPS) (EN-1) 2011 (**Ref 8.1**)	Sets out national policy for nationally significant infrastructure projects (NSIPs) in the energy sector. It contains the following policy statements that are 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*

Policy/Legislation/Guidance	Description
	harm cannot be avoided, then appropriate compensation measures should be sought" (Paragraph 5.3.7). ■ *"The most important sites for biodiversity are those identified through international conventions and European Directives. The Habitats Regulations provide statutory protection for these sites but do not provide statutory protection for potential Special Protection Areas (pSPAs) before they have been classified as a SPA. For the purposes of considering development proposals affecting them, as a matter of policy the Government wishes pSPAs to be considered in the same way as if they had already been classified. Listed Ramsar sites should, also as a matter of policy, receive the same protection"* (Paragraph 5.3.9). ■ *"Where a proposed development on land within or outside an SSSI is likely to have an adverse effect on an SSSI (either individually or in combination with other developments), development consent should not normally be granted. Where an adverse effect, after mitigation, on the site's notified special interest feature is likely, an exception should only be made where the benefits (including need) of the development at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of SSSIs*" (Paragraph 5.3.11). ■ *"Marine Conservation Zones (MCZs) (Marine Protected Areas in Scotland), introduced under the Marine and Coastal Access Act 2009, are areas that have been designated for the purpose of conserving marine flora or fauna, marine habitats or types of marine habitat or features of geological or geomorphological interest. The protected feature or features and the conservation objectives for the MCZ are stated in the designation order for the MCZ, which provides statutory protection for these areas implemented by the MMO…As a public authority, the IPC is bound by the duties in relation to MCZs imposed by sections 125 and 126 of the Marine and Coastal Access Act 2009"* (Paragraph 5.3.12). ■ *"Sites of regional and local biodiversity and geological interest, which include Regionally Important Geological Sites, Local Nature Reserves and Local Sites, have a fundamental role to play in meeting overall national biodiversity targets; contributing to the quality of life and the well-being of the community; and in supporting research and education"* (Paragraph 5.3.13). ■ *"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 NPS for Energy (EN-1) 2023 (**Ref 8.2**)	The government has published a draft update for EN-1, which has been consulted upon twice, but is not expected to be designated until Q3/Q4 2023 at the earliest. This updates the existing NPS with the addition of the principles of Biodiversity Net Gain (BNG), alongside

Policy/Legislation/Guidance	Description
	existing commitments to the protection of wildlife through avoidance of effects on designated sites and a commitment to avoidance and/or minimising effects rather than just mitigating for them.
National Planning Policy Framework (NPPF) 2021 (**Ref 8.3**)	The NPPF is the Government's planning policy for England and provides guidance for local planning authorities and decision-makers, both in drawing up plans and making decisions about planning applications. Section 15 of the framework, titled 'Conserving and enhancing the natural environment', states that "*planning policies and decisions should contribute to and enhance the natural and local environment*", and incorporates policies for minimising development impacts on both freshwater and marine biodiversity.
Stockton on Tees Borough Council - Local Plan - Adopted 30 January 2019 (**Ref 8.4**).	The Local Plan sets out the Council's policies and proposals to guide planning decisions and establishes the framework for the sustainable economic growth and development of the Borough up to 2032. Policy ENV5 "Preserve, Protect and Enhance Ecological Networks, Biodiversity and Geodiversity" states that: ■ *"Development proposals will be supported where they enhance nature conservation and management, preserve the character of the natural environment, and maximise opportunities for biodiversity particularly in or adjacent to Biodiversity Opportunity Areas in the River Tees Corridor, Teesmouth and Central Farmland Landscape Areas.* ■ *The Council will preserve, restore, and re-create priority habitats alongside the protection and recovery of priority species.* ■ *Ecological networks and wildlife corridors will be protected, enhanced and extended. A principal aim will be to link sites of biodiversity importance by avoiding or repairing the fragmentation and isolation of natural habitats.* ■ *Sites designated for nature conservation will be protected and, where appropriate enhanced, taking into account international, national and locally designated sites."*
Tees Valley Local Biodiversity Action Plan (LBAP) (updated 2012) (**Ref 8.5**)	LBAPs identify local priorities for biodiversity and work to deliver agreed actions and targets for priority habitats and species, as well as locally important wildlife and nature sites. The current Tees Valley Biodiversity Action Plan covers a number of local authority areas, including Stockton on Tees. The cornerstone of the plan is habitat and species action plans for locally identified priority habitats and species. As of 2012, the number of priority species has increased significantly to 51.
Legislation	
The Convention on the Conservation of European Wildlife and Natural Habitats 1979 (the 'Bern Convention')	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

Policy/Legislation/Guidance	Description
(**Ref 8.6**)	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 Oslo and Paris Convention for the Protection of the Marine Environment in the North-East Atlantic 1992 (the OSPAR Convention) (**Ref 8.7**)	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 and, when practicable, restore marine areas which have been adversely effected*". The OSPAR Convention includes a list of threatened and/or declining species and habitats. This list provides an overview of the biodiversity in need of protection in the north-east Atlantic and is used by the OSPAR Commission as a guide to the setting of priorities for further work. The area is broken up into five regions, with the Tees Estuary (and therefore Proposed Scheme) located in Region II: The Greater North Sea.
The Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS) 1991 (**Ref 8.8**)	The aim of the agreement is to promote close co-operation amongst Parties with a view to achieving and maintaining a favourable conservation status for small cetaceans. ASCOBANS is applied in all UK waters in accordance with existing statutory protection. A Conservation and Management Plan forming an Annex of the Agreement obliges Parties to engage in habitat conservation and management, surveys and research, pollution mitigation and public information.
The Convention on Migratory Species of Wild Animals (The Bonn Convention) 1979 (**Ref 8.9**)	Provides protection for endangered migratory species (listed in Appendix I) and their habitats. Appendix II species are those that have an unfavourable conservation status and that require international agreements for their conservation and management. The legal requirement for the strict protection of Appendix I and Appendix II species is provided by the Wildlife & Countryside Act (1981 as amended) (**Ref 8.10**).
The Convention for Wetlands of International Importance (Ramsar Convention) 1976 (**Ref 8.11**)	The UK is a signatory to the Ramsar Convention. The Convention has three main 'pillars' of activity: ■ The designation of wetlands of international importance as Ramsar sites; ■ The promotion of the wise use of all wetlands in the territory of each country; and, ■ International co-operation with other countries. The UK has chosen to underpin the designation of its Ramsar sites through prior notification of these areas as Sites of Special Scientific Interest (SSSIs) in England. Accordingly, these receive statutory

Policy/Legislation/Guidance	Description
	protection under the WCA 1981 (as amended). The UK Government has also issued policy statements relating to the special status of Ramsar sites. In respect to new developments, Ramsar sites are afforded the same level of protection as SACs and SPAs (at a policy level).
The Wildlife and Countryside Act 1981 (as amended) (WCA) (**Ref 8.10**)	The WCA transposes the Bern Convention (**Ref 8.6**) into UK Law. 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 the protection of plants and animals; ■ Nature conservation, countryside and National parks; and ■ Public Rights of Way (PRoW) The Act makes it an offence to intentionally kill, injure or take any wild animal listed on Schedule 5. Interference or disturbance with places (or animals occupying these places) used for rest, shelter or protection is also prohibited.
The Countryside and Rights of Way (CRoW) Act 2000 (**Ref 8.12**)	The CRoW Act has amended the WCA in England and Wales, strengthening the protection afforded to Sites of Special Scientific Interest (SSSI) and threatened species. It adds the word 'reckless' to the wording of the offences listed under Section 9(4) of the WCA. This alteration makes it an offence to recklessly commit an offence, where previously an offence had to be intentional to result in a breach of legislation.
The Natural Environment and Rural Communities Act 2006 (NERC Act) (**Ref 8.13**)	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 CRoW Act. Section 40 imposes a duty on public authorities to "*in exercising (their) functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity*". Section 41 provides a statutory list of species and habitats of principal importance for the purpose of conservation biodiversity. These are referred to as Habitats/Species of Principal Importance (HPI/SPI).
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') (**Ref 8.14**)	The Conservation of Habitats and Species Regulations 2017 (as amended) (the 'Habitats Regulations') consolidate the Conservation of Habitats and Species Regulations 2010 with subsequent amendments. The Regulations transpose the Habitats Directive (**Ref 8.15**) into national law.

Policy/Legislation/Guidance	Description
	All species listed under Annex IV of the Habitats Directive require strict protection and are known as European Protected Species (EPS). Under Regulation 42 of the Habitats Regulations, it is unlawful to: ■ Deliberately kill, capture or disturb; ■ Deliberately take or destroy the eggs of; and ■ Damage or destroy the breeding site/resting place of any species protected under this legislation. If it is determined that impacts to an EPS during a development are unavoidable then the works may need to be carried out under a site-specific mitigation licence from the Statutory Nature Conservation Organisation, in this case Natural England. Certain EPS are also listed under Annex II of the Habitats Directive and are afforded protection by the establishment of core areas of habitat known as Special Areas of Conservation (SACs). This means that 'Annex II species' under the Habitats Directive are a relevant consideration in a Habitats Regulations Assessment (HRA). Following the UK's exit from the EU, the Habitats Regulations were amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. The changes were to ensure the Regulations remained operable in the UK, following the UK's departure from the EU.
The Environment Act 2021 (**Ref 8.16**)	The Environment Act 2021 has two main functions: ■ To give a legal framework for environmental governance in the UK. ■ To bring in measures for improvement of the environment in relation to waste, resource efficiency, air quality, water, nature and biodiversity, and conservation. The Act includes provisions to strengthen and improve the existing duty on public bodies to conserve and enhance biodiversity, including mandating Biodiversity Net Gain (BNG) through the planning system. Schedule 14 of the Act makes provision for BNG to be a condition of planning permission in England. Schedule 14 specifies that biodiversity gains are to be assessed using the metric published by the SoS. The Act requires this for NSIPs, secured under Section 99 and Schedule 15. It is expected that the mandatory requirement for a 10% gain for NSIPs will come into force in November 2025. The vast majority of this Act does not make any immediate changes for organisations other than regulators. Changes to duties for businesses and other organisations are expected in subsequent legislation made under this Act.
Salmon and Freshwater Fisheries Act 1975 (SAFFA) (**Ref 8.17**)	SAFFA 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).

Policy/Legislation/Guidance	Description
	Under this Act any person who causes or knowingly permits 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 8.18**)	These regulations implement Council Regulation (EC) No 1100/2007[1] 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*".
Conservation of Seals Act 1970 (**Ref 8.19**)	The Act, under Section 1, protects all seals out to 12 nautical miles and prohibits the killing/taking of seals by certain methods. The Act prohibits the following methods of killing or taking seals without a licence: ■ Use of any poisonous substance; and ■ Use of any firearm other than a rifle with specified ammunition. There is an annual close season for grey seals extending from 01 September to 31 December, and an annual close season for harbour seals extending from 01 June to 31 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 presence of grey and harbour seals in the Tees Estuary (within the Proposed Scheme is adjacent to).

[1] Council Regulation (EC) No 1100/2007 Establishing measures for the recovery of the stock of European eel: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32007R1100

Policy/Legislation/Guidance	Description
The Water Environment (Water Framework Directive) (England and Wales) Regulations (the 'WFD Regulations') 2017 (**Ref 8.20**)	WFD Regulations provide a framework for managing the water environment in England through environmental objectives and a summary of the programmes of measures required to achieve those objectives. WFD Regulations provide a framework for managing the water environment in England through environmental objectives and a summary of the programmes of measures required to achieve those objectives. WFD Regulations cover 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 WFD 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 it 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 is required. This makes provision for deterioration of status, provided that certain stringent conditions are met.
The Environmental Targets (Biodiversity) (England) Regulations 2023 (**Ref 8.21**)	The Environmental Targets (Biodiversity) (England) Regulations 2023 sets out legally binding targets to protect our environment, clean up our air and rivers and boost nature. With reference to freshwater and marine biodiversity, Atlantic salmon *Salmo salar*, brown trout *Salmo trutta*, European eel, and white-clawed crayfish *Austropotamobius pallipes* are listed as priority species in the framework.
Guidance	
CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland (**Ref 8.22**)	The aquatic ecology assessment has been undertaken using the approach detailed in the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment (EcIA), hereafter referred to as 'the CIEEM EcIA Guidelines'. These guidelines represent the current best practice for assessing the ecological impacts of development projects.

Policy/Legislation/Guidance	Description
BS 42020: 2013 Biodiversity — Code of practice for planning and development (**Ref 8.23**)	Provides recommendations for ensuring that decisions taken at each step of the planning process are informed by appropriate ecological information.
Guidance for Pollution Prevention 2023 (**Ref 8.24**)	Provides environmental good practice guidance for the prevention of pollution, including water environments. This is applicable to the entire UK.
CIRIA 532 Control of Water Pollution form Construction Sites 2001 (**Ref 8.25**)	This document provides guidance for the control of water pollution arising from construction activities. It focuses on the potential sources of pollution from within sites and the effective methods of prevention.
Clearing the Waters for All 2017 (**Ref 8.26**)	Guidance relating to assessment of impact of activity on coastal and estuarine waters, relating to the WFD (**Ref 8.20**). Key stages to be considered are screening and scoping to identify potential at risk receptors.
North Atlantic Conservation Organisation (NASCO) Implementation plan for the period 2019-2024 (**Ref 8.27**)	Defra and the Welsh Government have a responsibility for salmon in England and Wales, working closely with the Environment Agency and Natural Resources Wales who are responsible for day-to-day management and regulation. The objectives are to: ■ Promote the conservation and maintain the diversity of migratory and freshwater fish, and to conserve their aquatic environment; ■ Enhance the contribution that migratory and freshwater fisheries make to the economy, particularly in remote rural areas and in areas with low levels of income; and, ■ Enhance the social value of fishing as a widely available and healthy form of recreation; For wild salmon, these objectives will be achieved by implementing the WFD (**Ref 8.20**) and the Habitats Regulations (**Ref 8.15**), and management/regulation of fisheries to ensure sustainable exploitation.

8.4. STUDY AREA

8.4.1. The Site covers a total area of 205.66 ha, which includes the main construction areas forming part of the Proposed Scheme, as well as access routes, temporary compounds and working areas required to undertake the Proposed Scheme.

8.4.2. The Study Area for the Proposed Scheme with regards to marine and freshwater ecology is the area where changes arising from construction and/or operation could lead to significant effects on marine or freshwater ecological receptors. For the purpose of this assessment, it is necessary to apply Study Areas of varying sizes depending on the ecological receptor/feature under assessment; all of which extend beyond the Site. These will hereafter be referred to as 'Zones of Influence' (ZoI) for each receptor.

8.4.3. The ZoI for each receptor have been defined based on current best practice guidelines and currently available project information. In some cases, ZoI have been defined on a precautionary basis using professional judgement alongside current guidance and available project information. This is to ensure a sufficient geographical area has been assessed to allow all reasonably foreseeable impacts to be considered. As the marine and freshwater ecology assessment progresses and further information becomes available, both in terms of survey results and project details/design, the ZoI may be subject to refinement later in the project lifecycle.

8.4.4. The Proposed Scheme's freshwater and marine ZoI are presented in **Table 8-2**.

Table 8-2 – Summary of Zone of Influence for freshwater and marine receptors

Receptor	Zone of Influence
Internationally Designated Sites	Within 10km radius from the Site, extended if there is a designated feature(s) of a particular site that is highly mobile and may be present within the vicinity of the Site.
Nationally Designated Site	Within 5km of the Site, extended if there is a designated feature(s) of a particular site that is highly mobile and may be present within the vicinity of the Site.
Non-Statutory Sites	Within 2km of the Site, extended if there is a designated feature(s) of a particular site that is highly mobile and may be present within the vicinity of the Site.
Freshwater	
Fish	Within the Site and hydrologically connected watercourses.
Aquatic Macroinvertebrates	Within the Site and hydrologically connected watercourses.
Macrophytes	Within the Site and hydrologically connected watercourses.
Invasive Non-Native Species (INNS)	Within 250m of the Site.
Marine	
Habitats (Subtidal and Intertidal)	Within 250m of the Site.
Benthic Communities	Within 250m of the Site.
Marine Plants and Macroalgae	Within 250m of the Site.
Fish	Within 5km of the Site.

Receptor	Zone of Influence
Marine Mammals	Within 5km of the Site
INNS	Within 250m of the Site.

8.5. BASELINE CONDITIONS AND FUTURE BASELINE

8.5.1. The baseline information for freshwater and marine biodiversity has been collated from the following publicly available sources:

- Defra's Multi-Agency Geographic Information for the Countryside (MAGIC) online map application[2].
- Open source 1:25,000 Ordnance Survey datasets[3];
- The Rivers Trust River Obstacles map application[4];
- Environment Agency (EA) Catchment Data Explorer (**Ref 8.28**);
- EA Ecology and Fish Data Explorer (**Ref 8.29**);
- EA Water Quality Archives (**Ref 8.30**);
- Tees Estuary Edges – case studies (**Ref 8.31**)
- International Union for Conservation of Nature (IUCN) Red List (**Ref 8.32**); and,
- Available grey literature and technical reports for projects on the River Tees, Tees estuary and surrounding inshore areas (**Ref 8.33** – **Ref 8.43**)

8.5.2. A summary of the baseline conditions is presented below. This assessment does not duplicate information set out in **Chapter 7: Terrestrial Ecology**. Baseline information for the terrestrial ecology assessment can be found in Chapter 7.

DESIGNATED SITES

8.5.3. Designated sites have been considered if they include features relating to freshwater and/or marine biodiversity, including aquatic habitats and species.

8.5.4. Records of such designated sites have been obtained within 10km of the Site. This distance has been extended accordingly if a direct and functional hydrological connection to the Site is present. Hydrological connectivity was determined using Ordnance Survey maps, aerial photographs, and the River Obstacle map application.

8.5.5. A summary of the designated sites relevant to freshwater and marine biodiversity is provided below.

[2] https://magic.defra.gov.uk/
[3] https://www.ordancesurvey.co.uk
[4] https://river-obstacles-theriverstrust.hub.arcgis.com

Internationally Designated Sites

8.5.6. Two internationally designated sites are located within 10km of the Site including the Teesmouth and Cleveland Coast Ramsar and SPA. The SPA boundary was updated in 2018 (based on an updated SSSI notification that amalgamates a number of former SSSIs in the area) while the current Ramsar boundary remains based on the former SPA boundary and description. No aquatic features are listed as Reasons for Designation, however aquatic habitats, such as intertidal sand and mudflats, saltmarsh, freshwater marsh, and saline lagoons are of great importance to a diverse assemblage of bird species (including designated species). Additionally, pools located in Saltholme Nature Reserve (part of the Ramsar and SPA) hold important assemblages of invertebrates protected under the Ramsar Convention (**Ref 8.11**). No information on the distribution of these important assemblages within Saltholme Reserve is available at this stage of the EIA process. Dorman's Pool and East Saltholme Pool are both located to the west of the Site, with Dorman's Pool adjacent to the SAF Plant Site.

Nationally Designated Sites

8.5.7. Two nationally designated sites are located within 2km of the Site, as detailed in **Table 8-3**.

Table 8-3 – Nationally Designated Sites within 2km of the Site

Designation	Distance from Site	Summary of designation[5]
The Teesmouth and Cleveland Coast (SSSI)	South west of the Site, adjacent to the heavy haulage road within the River Tees	The SSSI is of special interest for the following nationally important aquatic features that are present within and are supported by the wider mosaic of coastal and freshwater habitats centred on the Tees Estuary: ■ Saltmarshes ■ Breeding harbour seal *Phoca vitulina* ■ Invertebrates inhabiting sand dune habitats, which may include the damp depressions ('dune slacks').
Teesmouth National Nature Reserve (NNR)	970m to the north at its nearest point	Teesmouth NNR comprises a range of habitats, including sand dunes, grazing marsh, intertidal sand and mudflats. The area known as Seal Sands is one of the largest areas of

[5] Only aquatic features are included. Please refer to the Chapter 7: Terrestrial Ecology for remaining features.

Designation	Distance from Site	Summary of designation[5]
		intertidal mudflat on the north-east coast. Wildlife interest includes the presence of harbour seals and grey seals *Halichoerus grypus*. The harbour seals haul out on the sand banks at low tide, and pups are born at the site each summer. This makes Seal Sands the only regular breeding colony of this species on the north-east coast.

LOCALLY DESIGNATED SITES

8.5.8. There is one Local Nature Reserve (LNR) located within 2km of the Site, Berwick Hills Local Nature Reserve. This site is designated as a LNR due to the presence of a range of habitats of biodiversity value, including aquatic features such as ponds, reedbeds and running water in the form of Ormsby Beck stream. These aquatic habitats are known to support a range of species, including European eel elvers *Anguilla anguilla*.

WFD DESIGNATED WATERBODIES

8.5.9. The current Water Framework Directive (WFD) status for the Study Area was obtained from the Environment Agency's Catchment Data Explorer website. There is one WFD-designated water body located within the Study Area, the River Tees Water Body (GB510302509900) (**Ref 8.28**). The River Tees is tidally influenced, flows into the North Sea approximately 5km downstream of the Proposed Scheme and, borders the Site to the south. The Proposed Scheme will require access to Clarence Wharf (Option 2) on the river and may include the need for improvement works to the wharf to facilitate the heavy loads. The 2019 WFD ecological status of this water body was classified as Moderate Ecological Status overall. Poor nutrient management, pollution including sewage and heavy metals, and channel modifications are one of many stressors and reasons for the Tees failing to achieve Good overall status. The following biological quality elements are monitored in the Tees: fish (moderate) invertebrates (good), saltmarsh (moderate), phytoplankton (good) and macroalgae (moderate).

8.5.10. The River Tees water body includes the River Holme Fleet, which is a main river under the jurisdiction of The Environment Agency, flowing through the Saltholme Nature Reserve (RSPB site, adjacent to the Proposed Scheme to the West). River Holme fleet is culverted in parts of its reach (under the southern part of the Site) until it discharges into River Tees.

8.5.11. Outside of the Site are a series of watercourses/standing waterbodies hydrologically connected to the Teesmouth and Cleveland Coast Ramsar. These are a network of

ditches and ponds to the west of the Site. These waterbodies are of uncertain ecological importance. Their importance will be investigated further during the aquatic habitat survey which will assess these waterbodies' ability to support notable and/or species of conservation importance. The methodologies and results will be detailed in full in the Preliminary Ecological Appraisal (PEA) and discussed further as part of the PEIR.

8.5.12. Water resource receptors including the WFD have been assessed in more detail in **Chapter 9: Water Environment and Flood Risk**.

FRESHWATER ECOLOGY

8.5.13. A desk study using the Environment Agency's Ecology and Fish Data Explorer was undertaken to determine notable and/or protected freshwater species within the Study Area. It comprised macrophytes, aquatic macroinvertebrates and fish (both freshwater and migratory).

Macrophytes

8.5.14. Macrophyte surveys have been undertaken by the Environment Agency between 2013 and 2016 at Greatham Beck (NZ4894427840), Claxton Burn (NZ4720027800), North Burn (NZ4810027200) and Cowbridge Beck (NZ4830025700). All survey locations are located approximately 7km upstream from the Site. No protected or notable species were recorded. An invasive Himalayan balsam *Impatiens glandulifera* (terrestrial species) was recorded at Greatham Beck.

Aquatic macroinvertebrates

8.5.15. Aquatic macroinvertebrate surveys have been undertaken by the Environment Agency between 2015 and 2019 as part of their environmental monitoring programme (**Ref 8.29**), approximately 7km upstream, north west of the Site. The samples were obtained using kick sampling methods and analysed in the laboratory.

8.5.16. At Greatham Beck (NZ4894427840) approximately 7km north west of the Site, a survey in 2015 returned no protected or notable species. One INNS mollusc, the New Zealand mud snail *Potamopyrgus antipodarum* was recorded. However, it must be noted that this species is widespread throughout the UK and is considered naturalised.

8.5.17. At Claxton Burn (NZ46885 27771) approximately 8km form the Site, a nationally scarce insect of the family Capniidae *Capnia atra* was recorded in 2019. This stonefly insect is restricted to high altitudes.

8.5.18. Sampling at Dabholm Gut (NZ5657023772) in 2016 returned a poor assemblage of aquatic macroinvertebrates featuring crustaceans: isopod *Asellus aquaticus and freshwater shrimps Gammarus zaddachi* and *Gammarus pulex/fossarum* agg.; True fly larvae Chironomidae, the riffle beetle *Elmis aenea* and worms Oligochaeta. One INNS mollusc, the New Zealand mud snail was also recorded.

8.5.19. Survey at Cowbridge Beck (NZ4790125744) in 2018 approximately 5.5km to the north west of Site returned no protected or notable species. The INNS mollusc New Zealand mud snail was again recorded.

8.5.20. An aquatic macroinvertebrate survey at Billingham Beck (NZ4370723478) in 2019 approximately 9km upstream of the Site, to the west, recorded two INNS species, the signal crayfish *Pacifastacus leniusculus* and an amphipod *Crangonyx pseudogracilis/floridanus*. However, it must be noted that the latter is widespread throughout the UK and considered naturalised.

Freshwater Fish

8.5.21. The desk study of fish survey using the Environment Agency's Ecology and Fish Data Explorer returned fish counts data that has been utilised from the Tees Barrage Elver Pass in 2010 (NZ4622019073), approximately 5km from Site (**Ref 8.29**). In 2013 and 2015 another desk study found records of juvenile European eel elvers, further downstream at Ormesby Beck (NZ5080119588) approximately 4km south west of the Site. A species of stone loach *Barbatula barbatula*, three-spined stickleback *Gasterosteus aculeatus* and European eel elvers were also recorded. Within years 2016 to 2019, monitoring at Warm up pool (NZ4617719106), approximately 8km upstream from Site to the west, (NZ4617719106), the following species were found: European eel elvers, roach *Rutilus rutilus*, pike *Esox lucius*, gudgeon *Gobio gobio*, chub *Leuciscus cephalus*, dace *Leuciscus leuciscus*, perch *Perca fluviatilis*, flounder *Platichthys flesus*, roach x common bream hybrid *Rutilus rutilus* x *Abramis brama* and brown/sea trout. In the vicinity of the Tees barrage at Canoe slalom (NZ4637719170), fish count surveys in 2016 and 2017 returned the following fish species: dace, roach, Atlantic salmon and brown/sea trout.

Migratory Fish

8.5.22. Migratory fish species, such as Atlantic salmon, brown/sea trout, European eel, and river lamprey, are present in the Tees Estuary (as highlighted in the following marine baseline). These diadromous species, all of which are protected under the NERC Act as Species of Principal Importance (SPI), migrate from marine waters through the Tees Estuary to freshwater spawning/nursery sites. Therefore, these species are assumed to be present in freshwater environments within the Site if suitable habitat is available. This will be confirmed following future Preliminary Ecological Appraisal (PEA) and a fish eDNA survey.

MARINE ECOLOGY

Abiotic Conditions

8.5.23. The Proposed Scheme borders the Tees estuary, which is a transitional environment comprised of brackish water.

8.5.24. The temperature in this section of the Tees ranges from 5.8 – 16.2°C, with a salinity regime that ranges from 9.5 – 30.9 parts per thousand (ppt). This data was acquired from Environment Agency WIMS database, Tees at Smiths Dock monitoring station (within Study Area; **Ref 8.30**).

Benthic Habitats and Associated Communities

8.5.25. The intertidal substrate within the Tees Estuary, is predominantly comprised of mud and sand. However, patches of gravel are also present. Additionally, there are areas of intertidal substrate described as 'Man Made', which is indicative that artificial substrate is present. Multiple anthropogenic features constrain the High Water Mark (i.e. flood defences), with permanent inundation of most intertidal areas along the estuary. This has made the remaining intertidal zone very narrow and steep in profile (**Ref 8.31**).

8.5.26. One priority intertidal habitat is present within the Study Area; intertidal mudflats. Intertidal mudflats are a UK Biodiversity Action Plan (UKBAP) priority habitat, legally protected as a Habitat of Principal Importance (HPI) under Section 41 of the NERC Act. This habitat type is also listed in the OSPAR Convention as a threatened and/or declining habitat in Region II (the Great North Sea). Six patches of mudflat habitat are present within the Study Area, equating to a total area of approximately 21.08 ha. These areas of mudflat habitat are also classified as a WFD Lower Sensitivity Habitat (Intertidal Soft Sediment - Sand, Mud & Mixed A2.2, A2.3, A2.4).

8.5.27. Coastal saltmarsh is present within the Tees Estuary. The closest recorded location to the Proposed Scheme is at the confluence of the River Tees and Grantham Creek, approximately 3.5km downstream from the westward extent of the Site. Coastal Saltmarsh is a UKBAP Priority Habitat and HPI, WFD Higher Sensitivity Habitat, and listed as a threatened and/or declining habitat under the OSPAR Convention (Region II). Saltmarsh is also a Reason for Notification for The Teesmouth and Cleveland Coast SSSI as a nationally important feature.

8.5.28. The subtidal substrate present within the Study Area entirely consists of sand and mud. This is not classified as an HPI, however, it is a WFD Lower Sensitivity Habitat (Subtidal Soft Sediment - Sand, Mud & Mixed A5.2, A5.3, A5.4).

8.5.29. Contaminant analysis was undertaken on sediment samples collected as part of The Net Zero Teesside project. The samples were collected approximately 4 – 8km from the Proposed Scheme, in Bran Sands, South Gare and Coatham Sands. The findings from these samples indicated that despite the industrialised nature of the surrounding area, there is no evidence of contaminant levels which would be expected to cause harm to benthic habitats and species (**Ref 8.33**).

8.5.30. The benthic invertebrate community was recorded at an EA Transitional Coastal (TraC) monitoring location (NZ 54446 26476), approximately 3.3km downstream from the Study Area. Grab samples were collected from multiple depths (5 – 15m), with the most recent sample collected in 2016 (**Ref 8.29**).

8.5.31. The assemblage was dominated by polychaetes, notably *Ophryotrocha* sp., *Euchone* sp., and *Manayunkia aestuarina*, which is typical of brackish waters. The marine mudsnail *Peringia ulvae* and sludgeworms *Tubificoides benedii* were also present in high abundance. Species of roundworms (Nematodes), crustaceans, echinoderms, flatworms (Turbellaria), ribbon worms (Nemertea), cnidarians, mites (Acari),

springtails (Collembola), horseshoe worms (Phoronida) and tunicates were also recorded.

8.5.32. No protected or notable species were recorded within the samples. One INNS was observed in 2016, a bivalve known as the false anglewing *Petricolaria pholadiformis*. Whilst not recorded in 2016, the gammarid *Monocorophium acherusicum* was detected at the site in 2013. The INNS soft-shell clam *Mya arenaria* has also been recorded in the Tees Estuary in 2010 (NZ 48419 22082; **Ref 8.29**); this species is believed to be non-native, however is now widespread and considered naturalised within the UK.

Phytoplankton

8.5.33. Phytoplankton is regularly monitored in the Tees Estuary by the EA, with two monitoring sites located within the Study Area (NZ 52800 22100 and NZ 49900 21300). The EA collects monthly samples from these locations (some months have been excluded, mainly during UK Covid Lockdown periods, such as Jan – April 2019; April – September 2020).

8.5.34. The most abundant taxa were diatoms, with euglenophytes, cyanobacteria and microflagellates also found in high abundance. This composition is typical of phytoplankton communities in UK estuaries. Greatest abundance typically occurs between May and August, peaking in June, with lower abundance observed in winter months (November to January).

8.5.35. No protected or invasive taxa were identified during EA surveys (2015-2023), however taxa known to cause harmful algal blooms in the UK coastal waters were present. This includes: *Alexandrium* spp., *Dinophysis acuminata*, *Dinophysis acuta*, and *Pseudo-nitzschia* spp.. Additionally, several taxa known to cause fish mortality were also recorded; these include *Gymnodinium* spp., *Dictyocha speculum*, and *Chaetoceros* spp. (**Ref 8.34**; **Ref 8.35**).

Marine Plants and Macroalgae

8.5.36. Data regarding marine plants and macroalgae in the Study Area is limited. However, following intertidal and subtidal surveys conducted as part of The Net Zero Teesside Project, the surveyed section of the Tees Estuary was determined to have low abundance and diversity of macroalgae (**Ref 8.33**). In these surveys, sea lettuce *Ulva* sp., purple laver *Porphyra umbilicalis*, and fucoids (serrated wrack *Fucus serratus*, horned wrack *Fucus ceranoides* and, bladderwrack *Fucus vesiculosus*) were observed. Additionally, one invasive species of intertidal kelp, wakame *Undaria pinnatifida*, was also recorded.

8.5.37. Native seagrass, which is predominantly comprised of common eelgrass *Zostera marina*, is also present in the Tees Estuary. Whilst a large amount of this habitat has been lost, restoration projects are being undertaken, including in North Gare, approximately 5km downstream of the Proposed Scheme (**Ref 8.36**).

Fish

8.5.38. The Study Area falls within the Marine Management Organisation (MMO) North-East inshore Marine Plan area and the International Council for the Exploration of Sea (ICES) rectangle 32E8. The management plan in relation to fish includes long term strategic plans for the fishing industry in the area; the support for sustainable fishing activities; the protection of fisheries habitats; the encouragement of biodiversity gain for essential fish habitats and the avoidance or management of impacts on essential fish habitats.

8.5.39. The River Tees and estuary is an important water body for diadromous fish species that make seasonal migrations between freshwater and marine environments. Atlantic salmon, sea trout, European eel, river lamprey *Lampetra fluviatilis* and sea lamprey P*etromyzon marinus* are known to be present and identified as Local Priority Species within the Tees Valley BAP (**Ref 8.37**). These species are afforded further protection, as detailed in **Table 8-6.**

8.5.40. The River Tees is designated as one of the 64 'principal salmon rivers' in England and Wales. There is currently a Salmon Action Plan that aims to manage the performance of salmon stocks within the River Tees against Conservation Limits (CL). The CL is a standard defining whether the stocks in a river are doing well or badly. Currently, the River Tees is not achieving its CL, and is projected to remain 'at risk' of not complying with the salmon management objectives (**Ref 8.38**). Within an 'at risk' river such as the River Tees it is stipulated that urgent steps must be taken to reduce exploitation by all fisheries to zero.

8.5.41. Estuarine and marine fish assemblage within the Tees estuary consist of demersal and pelagic species typical of the North Sea. Data from an EA monitoring site located approximately 4km downstream from the Proposed Scheme (NZ 53946 26617) is presented in **Table 8-4**. Only the most recent data (2015-2018) was considered, as this is the most temporally relevant.

Table 8-4 – Environment Agency fish data, North Gare Sands, Tees Estuary

Common Name	Latin Name	2015	2016	2017	2018
Herring*†	*Clupea harengus*	174	29	10	564
Plaice*†	*Pleuronectes platessa*	20	16	12	9
Lesser sandeel	*Ammodytes tobianus*	206	1	373	17
Flounder†	*Platichthys flesus*	21	2	21	-

Common Name	Latin Name	2015	2016	2017	2018
Sprat†	*Sprattus sprattus*	2	276	7	-
Sand goby	*Pomatoschistus minutus*	10	3	1	-
Dab	*Limanda*	1	1	1	-
Three-spined stickleback	*Gasterosteus aculeatus*	1	-	-	-
Five-bearded rockling	*Ciliata mustela*	1	-	-	-

*Protected species
†Commercially targeted species

8.5.42. The EA also undertakes fish surveys at the Tees barrage (NZ 46789 19328; NZ 46789 19328), which is located approximately 5km downstream of the Site. The assemblage was similar to that at North Gare Sand (**Table 8-5**). However, the barrage is where the River Tees transitions into a freshwater environment, and therefore the fish assemblage will likely become increasingly dominated by freshwater species at sites upstream of the barrage.

Table 8-5 – Environment Agency fish data, Tees Barrage, 2015

Common Name	Latin Name	Sample A (NZ 46789 19328)	Sample B (NZ 46789 19328)
Plaice*†	*Leuronectes platessa*	3	157
Sprat†	*Sprattus sprattus*	2	3
Dab	*Limanda limanda*	3	2
Dover sole†	*Solea solea*	1	-
Sand goby	*Pomatoschistus minutus*	3	5
Whiting†	*Merlangius merlangus*	-	1
Flounder†	*Platichthys flesus*	78	29
Common goby	*Pomatoschistus microps*	37	8
Brown/sea trout*	*Salmo trutta*	1	-

Common Name	Latin Name	Sample A (NZ 46789 19328)	Sample B (NZ 46789 19328)
Herring*†	*Clupea harengus*	258	27

8.5.43. Fisheries sensitivity maps (**Ref 8.39**) indicate The Tees Estuary provides nursing grounds for several marine species. This includes herring, plaice, whiting (high intensity); and cod, dover sole, anglerfish and spiny dogfish (low intensity). Therefore, juveniles of these species could potentially be present within the vicinity of the Tees estuary that is immediately adjacent to the Proposed Scheme. The protection afforded these species is detailed in **Table 8-6.**

Table 8-6 – Summary of fish species protected by national or international legislation/policy

Common Name	Latin Name	Habitats Directive (Annex)	OSPAR threatened and/or declining species	Bern Convention (Appendix)	Bonn Convention (Appendix)	NERC 2006 Species of Principal Importance	IUCN Red List[6]
Herring	*Clupea harengus*					☑	LC (á)
Plaice	*Pleuronectes platessa*					☑	LC (á)
Cod	*Gadus morhua*		☑			☑	LC (á)
Whiting	*Merlanguis merlangius*					☑	LC (?)
Dover sole	*Solea solea*					☑	LC (?)
Anglerfish	*Lophius piscatorius*					☑	LC (?)
Spurdog/ Spiny dogfish	*Squalus acanthias*		☑		II	☑	EN (â)
Atlantic salmon	*Salmo salar*	II, V	☑			☑	VU (â)

[6] IUCN Red List of Threatened Species. European classification: LC = Least Concern, EN = Endangered, CR = Critically Endangered. Population trend: ↑ = increasing, ↓ = decreasing, ? = Unknown.

Common Name	Latin Name	Habitats Directive (Annex)	OSPAR threatened and/or declining species	Bern Convention (Appendix)	Bonn Convention (Appendix)	NERC 2006 Species of Principal Importance	IUCN Red List[6]
Sea trout	*Salmo trutta*					☑	LC (?)
European eel	*Anguilla anguilla*		☑			☑	CR (â)
Sea lamprey	*Petromyzon marinus*	II	☑	III		☑	LC (?)
River lamprey	*Lampetra fluviatilis*	II, V		III		☑	LC (?)

8.5.44. Common shellfish species are present within the inshore waters. Shellfish surveys conducted on inshore waters as part of the Dogger Bank Teesside Project and Teesside Offshore Wind Project (approximately 8 – 12km from the Site) recorded edible crab *cancer pagurus*, harbour crab *Liocarcinus depurator*, European lobster *Homarus Gammarus* and velvet swimming crab *Necora puber* surveys in high abundance (**Ref 8.40; Ref 8.41**). However, there are no designated shellfish waters within the vicinity of the Site.

Marine mammals

8.5.45. The abundance and density of marine mammals within the Tees Estuary/River Tees (and therefore immediate vicinity of the Proposed Scheme) is anticipated to be low, however due to the highly mobile and transient nature of marine mammals they could be present within the Study Area.

8.5.46. Within the Greater North Sea Ecoregion, four species of cetaceans occur commonly or are resident: harbour porpoise *Phocoena phocoena*, minke whale *Baleanoptera acutorostrata*, bottlenose dolphin *Tursiops truncates* and white-beaked dolphin *Lagenorhynchus albirostri*. Five more species occur less commonly: Atlantic white-sided dolphin *Lagenorhynchus acutus*, orca *Orcinus orca* (killer whale), long-finned pilot whale *Globicephala melas*, Risso's dolphin *Grampus griseus* and short-beaked common dolphin *Delphinus delphis* (**Ref 8.42**).

8.5.47. Apart from the harbour porpoise, it is unlikely that any of these species will be present within the vicinity of the Site. The protective status of the harbour porpoise is detailed in **Table 8-7.**

8.5.48. There are two pinniped species within the Tees Estuary, the grey seal Halchoerus grypus and harbour seal Phoco vitulina.

8.5.49. A small population of resident harbour seals are present within the River Tees, and haul out at Seal Sands and Greatham Creek, approximately 4.5km from the Study Area. Harbour seals also use the Tees estuary as a breeding site, with breeding harbour seals listed as a Reason for Notification for The Teesmouth and Cleveland Coast SSSI.

8.5.50. There are no reported breeding sites for grey seals in the Tees Estuary, however this species also hauls out at Seal Sands (**Ref 8.43**).

8.5.51. Both species are protected under the Conservation of Seals Act 1970. Further protective status of the two seal species is detailed in **Table 8-7**.

Table 8-7 – Summary of marine mammal species protected by national or international legislation/policy

Common Name	Latin Name	WCA	EC Habitats Directive (Annex)	Bern Convention (Appendix)	Bonn Convention (Appendix)[7]	OSPAR threatened and/or declining species	ASCOBANS
Harbour porpoise	*Phocena phocena*	☑	II, IV	II	II	☑	☑
Harbour seal	*Phoco vitulana*	☑	II, V	III			
Grey seal	*Halichoerus grypus*	☑	II, V	III			

FUTURE BASELINE

8.5.52. Climate change is the most prevalent factor when attempting to predict the future baseline of an ecosystem or species community. Climate change is projected to lead to warmer, wetter winters and hotter, drier summers, with an increase in the intensity and frequency of extreme events such as heatwaves, drought, extreme rainfall leading to flash flooding, storms and wind events. Further information is provided in **Chapter 9: Water Environment and Flood Risk** and **Chapter 13: Climate Change Resilience.**

8.5.53. Impacts of climate change on species are considered to include changes in distribution and abundance, the timing of seasonal events and habitat use and, as a consequence, there are likely to be changes in the composition of plant and animal communities. Habitats and ecosystems are also likely to change in character.

8.5.54. The information presented below illustrates how changes within the climate may impact upon freshwater and marine receptors.

Freshwater Receptors

Aquatic Flora

8.5.55. Climate change resulting in drought, flooding, pollution and subsequent changes in land management has the potential to impact on aquatic plants (including macrophyte communities) and algae occurring in freshwater habitats. Furthermore, rising water temperatures may provide more suitable habitat conditions for invasive algal species

[7] North and Baltic Sea, western North Atlantic, Black Sea and North West African populations

and potentially lead to more frequent algal blooms. Changes in species composition, abundance and distribution, as well as loss of aquatic plants and algae would also impact on invertebrates and animals higher up the food chain that depend on them.

Aquatic macroinvertebrates

8.5.56. Similarly for freshwater invertebrates, climate change effects have the potential to adversely affect invertebrates with changes in community composition, abundance and distribution and especially for those that are sensitive to drying.

Freshwater Fish

8.5.57. Higher temperatures and drought are main stressors on freshwater fish as the amount of dissolved oxygen reduces with temperature increase. Aquatic invertebrates will decline due to lower water quality and reduce the main food source of fish.

Marine Receptors

Marine Habitats

8.5.58. Coastal squeeze (barrier to natural habitats migrating landward in response to sea level rising) may cause the loss of intertidal habitats, such as saltmarsh and intertidal mudflat, which will have an impact on the associated intertidal species due to reduced or loss of habitat.

Benthic Communities (subtidal and intertidal)

8.5.59. Rising sea levels and increasing water temperatures may result in a species regime shift due to northward range expansion of 'southern species' and a retreat of 'northern species'. Increased water temperatures may also result in increased habitat viability for INNS, which may cause the degradation or loss of native benthic species. Rising sea levels may also result in an increase in the habitat available for subtidal species and a reduction for intertidal adapted species.

Marine Plants and Macroalgae

8.5.60. 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 increase the amount of habitat available for intertidal algal species and may result in increased colonisation of the river wall.

Fish

8.5.61. Rising sea levels and increasing water temperatures may result in a regime shift due to northward range expansion of 'southern species' and a retreat of 'northern species'. Alterations to habitat types, including coastal squeeze may also result in changes in fish community composition.

Marine Mammals

8.5.62. 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 and the subsequent distribution of marine mammals.

Invasive Non-Native Species

8.5.63. The effects of climate change, including rising sea levels and increasing water temperatures, may facilitate the spread and establishment of INNS through increased habitat viability and reduced competition/predation.

8.6. SENSITIVE RECEPTORS

8.6.1. The likely sensitive freshwater and marine receptors within the Proposed Scheme's ZoI have been identified in **Table 8-8**.

Table 8-8 – Summary of sensitive receptors

Receptor Type	Specific Receptor	Location relative to the Site
Designated Sites		
Internationally designated site	Teesmouth and Cleveland Coast SPA/Ramsar	Adjacent
Nationally designated site	Teesmouth and Cleveland Coast SSSI	Adjacent
Nationally designated site	Teesmouth NNR	970m north
Locally designated site (statutory)	Berwick Hills LNR	1.7km south
Freshwater		
Macrophytes	A range of species.	Within and adjacent
Invertebrates	A range of species	Within and adjacent
Fish	Protected/notable species, including Atlantic salmon, sea trout, European eel and lamprey species.	Within and adjacent
Freshwater habitat	River habitat, Standing water (network of ditches and ponds.	Within and adjacent
WFD Designated River Tees	River Tees and its tributaries	Adjacent
Marine		

Receptor Type	Specific Receptor	Location relative to the Site
Marine habitat	Intertidal Mudflats	Adjacent
Marine habitat	Coastal Saltmarsh	3.5km downstream
Benthic communities	A range of species	Adjacent
Phytoplankton	A range of species	Adjacent
Marine Plants and Macroalgae	A range of species	Adjacent
Fish	Protected/notable species, including Atlantic salmon, sea trout, European eel and lamprey species.	Adjacent
Marine Mammals	Harbour porpoise, harbour seal, and grey seal	Adjacent

8.7. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

DESIGN MEASURES

8.7.1. At this stage, the detailed design of the Proposed Scheme is uncertain and will be confirmed at a later date.

8.7.2. Impacts on sensitive receptors that may occur during the Proposed Scheme's construction and operation will be avoided as much as feasibly possible and important freshwater and marine biodiversity features retained.

8.7.3. Given that there are notable and protected species, as well as sensitive habitats capable of supporting these species within the ZoI, additional surveys are recommended, including fish, macrophytes, aquatic macroinvertebrate and invasive species. The data from further surveys that are undertaken will be presented in relevant survey reports within the PEIR or as part of the ES, depending on time scales.

MITIGATION MEASURES

8.7.4. Mitigation will be developed on an iterative basis, with the mitigation hierarchy followed; preference will be given to first avoiding effects, then reducing remaining effects, before targeted mitigation where necessary. Where residual effects remain after application of targeted mitigation and significant adverse effects are likely, compensation will then be considered. These will constitute a range of different interventions, depending on the species or habitat. The 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.

Construction

8.7.5. Mitigation during the construction phase is likely to include:

- A minimised construction footprint should be considered through the selection of options which require less intrusion into the marine and freshwater environments reducing and/or avoiding potential habitat loss. This includes potential improvement works at Clarence Wharf.
- Adherence to relevant Environmental Permits (for example Natural England SSSI assent), Best Practice Guidance and Regulations, British Standards, MMO licence and any relevant species licences;
- Monitoring to ensure the protection of marine and freshwater biodiversity features;
- Implementation of industry standard best practice methods and procedures to ensure water quality impacts are minimised. This includes measures for pollution prevention, such as the creation of a robust surface water drainage system and use of silt fences (where necessary);
- Timing of works: consideration will be given to undertaking construction activities such as piling outside of sensitive periods of protected and notable fish species within River Tees and any waterbodies within the Site. This includes migration and spawning periods;
- Use of sensitive lighting where any night work is required, with light spill onto aquatic environments minimised;
- Employment of noise reduction measures on operational plant machinery and equipment;
- Construction activity that may cause direct disturbance to the marine environment (such as piling) should also not commence unless an Ecological Clerk of Works (ECoW) is present. This is to ensure sensitive species, notably marine mammals, are absent from the area and to prevent damage to any important habitats;
- The use of appropriate piling methods such as soft start to allow noise sensitive species to move away from the construction area; and,
- Implementation of reduced vessel speeds in proximity to both Wharfs to reduce potential for vessel strike with marine mammals and potential damage to intertidal habitats from wave wash.

8.7.6. Many of these mitigation measures will be addressed in a Construction Environmental Management (CEMP). The CEMP will detail a series of measures, based on best practice guidelines, to avoid the effects of the Proposed Scheme on the environment.

8.7.7. The details of selected options for marine deliveries are not specified at the time of EIA scoping, however a Code of Construction Traffic Management Plan and Code of Construction Practice will be prepared and submitted within the PEIR and ES.

8.7.8. An Invasive Non-Native Species (INNS) Management Plan will be prepared to prevent the spread of INNS identified through desk study and future surveys within the Proposed Scheme.

Operation

8.7.9. Mitigation measures during the operation phase are likely to include:

- Adherence to relevant Environmental Permits, Best Practice Guidance and Regulations and British Standards;
- Ongoing monitoring the ensure the protection of marine and freshwater biodiversity features;
- Implementation of industry standard methods, best available technology and procedures to ensure water quality impacts are minimised;
- Appropriate design of the Proposed Scheme to minimise water quality impacts on surrounding habitats, including waterbodies within RSPB Saltholme and the River Tees;
- Sensitive lighting scheme for any permanent lighting to be installed as part of the Proposed Scheme; and,
- Implementation of reduced speed of operational vessels to reduce the potential for vessel strike with marine mammals and potential damage to intertidal habitats from wave wash.

8.7.10. Further mitigation measures may be identified as the design of the Proposed Scheme develops and will be addressed in the PEIR or ES.

Enhancement Measures

8.7.11. With regard to habitat compensation and enhancement, the principles of BNG will be applied, with the Proposed Scheme seeking to achieve at least a 10% net gain in biodiversity units of all habitats relative to the baseline. This is discussed further in **Section 8.9 below**.

8.8. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

8.8.1. The Proposed Scheme has the potential for likely significant effects during the construction phase, these could include:

- Potential damage, degradation or loss of habitats within designated conservation sites, or disturbance of aquatic species listed as designated features from activities such as wave wash (from increased navigation) and piling.
- Increased pollution risks from spillage of fuels or other harmful substances that may spill directly into or migrate to surface water, which could negatively impact aquatic habitats and species through direct and indirect disturbance and/or degradation;

- Increased pollution risk from sedimentation caused by surface water run-off from areas of bare earth, construction materials such as aggregate, stockpiles of topsoil or discharge of groundwater dewatering;
- Changes to water quality within the River Tees associated with potential works to existing docks/wharfs, and potential disturbance of bed materials from piling and increased wave wash (from increased navigation);
- Loss or physical disturbance/degradation of benthic habitats and species within the River Tees associated with potential improvement works to Clarence Wharf and increased navigation;
- Changes in the behaviour due to disturbance (e.g. avoidance) and/or physical damage to fish and marine mammals present within the River Tees due to changes in the underwater soundscape during potential improvement works to Clarence Wharf and increased navigation.
- Disturbance/avoidance behaviours in pinnipeds due to changes in the airborne soundscape during construction works. Notably, avoidance/disturbance to haul out or breeding locations;
- Disturbance to fish and marine mammals present within the River Tees due to changes in visual stimuli (notably artificial light spill) during potential improvement works to Clarence Wharf;
- Vessel strikes/collisions with marine mammals within the River Tees due to increased navigation;
- Potential spread of INNS during construction activities through vessel/vehicle movements.

OPERATION PHASE

8.8.2. The operation of the Proposed Scheme has the potential for likely significant effects on aquatic receptors, these could include:

- Polluted surface water run-off and spillage risks containing silts, hydrocarbons or other harmful chemicals that may migrate or be discharged to surface water features, which could negatively impact aquatic habitats and species through direct and indirect disturbance and/or degradation;
- Changes to water quality (including suspension of sediment bound contaminants) within the River Tees associated with operational navigation (resulting from wave wash disturbing sediment). This could negatively impact benthic communities, phytoplankton, fish, marine macroalgae, and marine mammals (pinnipeds and harbour porpoise);
- Disturbance, avoidance and/or physical damage to fish, pinnipeds and harbour porpoise present within the River Tees due to changes in the underwater soundscape within the River Tees associated operational navigation;
- Disturbance/avoidance behaviours in pinnipeds (notably in haul out/breeding locations) due to changes in the airborne soundscape associated with the operation of the Proposed Scheme;

- Disturbance to fish and marine mammals present within the River Tees due to changes in visual stimuli, (notably artificial light spill) associated with the operation of the Proposed Scheme and increased navigation;
- Vessel strikes/collisions with pinnipeds and harbour porpoise within the River Tees due to operational navigation;
- Potential spread of INNS during operational navigation.

8.8.3. Specific operational impacts for the Proposed Scheme have not yet been defined and will be subject to further assessment.

DECOMMISSIONING

8.8.4. It is assumed that after the lifespan of the Proposed Scheme, before or upon 30 years, a process of decommissioning will take place. This is assumed to last up to 18 months. Potential significant impacts associated with decommissioning would likely be similar to those listed for construction above, and include increased navigation, road traffic, and potential water quality issues (as the materials are to be crushed and removed from the Site). Further surveys may be required to assess if there have been changes in the ecological baseline at that time.

8.9. ELEMENTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

8.9.1. **Table 8-9** details all elements (receptors and or features) to be scoped in or out of the aquatic ecology assessment. Each element is accompanied by a justification for its inclusion or exclusion from further assessment basing on professional judgement.

Table 8-9 – Elements scoped in or out of further assessment.

Element	Phase	Scoped In	Scoped Out	Justification
Designated Sites				
Internationally designated sites	Construction/ Operation	✔		Construction and operation activities could cause the loss/degradation/disturbance of aquatic habitats within The Teesmouth and Cleveland Coast Ramsar/SPA that are of importance to designated species. Activities are not anticipated to impact haul out or breeding locations of the harbour seal (designated feature), however some activities may cause visual and acoustic disturbance to those moving/foraging in the Tees estuary adjacent to the Proposed Scheme
Nationally designated sites	Construction/ Operation	✔		Construction and operation activities have the potential to negatively impact aquatic features of The Teesmouth and Cleveland SSSI through habitat loss/degradation,

Element	Phase	Scoped In	Scoped Out	Justification
				visual disturbance and decreased water quality. Operation activities are only anticipated to affect one designated feature – harbour seals. Direct impact on the breeding and haul out site at Seal Sands is not anticipated due to distance from the Proposed Scheme, however individuals foraging/moving throughout the impacted area of the Proposed Scheme could be indirectly impacted during operation activities. The other aquatic designated features, saltmarsh and invertebrates inhabiting sand dune habitats, are not anticipated to be impacted due to the distance from the Proposed Scheme.
Non-statutory sites	Construction/ Operation	✔		Construction and operation activities have the potential to indirectly impact grey seals and harbour seals, which are an important mobile feature of the Teesmouth NNR. No other features of this NNR (including intertidal sand and mudflats) are expected to be impacted due to the distance from the Proposed Scheme and/or lack of hydrological connectivity
Freshwater				
Fish	Construction/ Operation	✔		Protected fish species are present within the Site, and migratory diadromous species have been recorded in the River Tees. Water quality impacts (pollutants and suspending sediments), alterations to visual stimuli (artificial light spill) and alterations to underwater soundscape (notably piling) during construction could result in direct harm, and also incur disturbance/avoidance behaviours. Water quality impacts during operation could also impact freshwater fish communities.

Element	Phase	Scoped In	Scoped Out	Justification
Invertebrates	Construction/ Operations	✔		The Saltholme Nature Reserve which is just outside of the Site hosts invertebrate species of conservation interest. As discussed in **Chapter 9: Water Environment and Flood Risk.** construction and operation activities could have impacts on surface water quality by introducing pollutants and suspending sediments, which may negatively impact invertebrate communities. Whilst standard mitigation measures can be incorporated into Proposed Scheme to reduce the water quality impacts, invertebrates remain scoped in due to the potentially high sensitivity of freshwater environments.
Macrophytes	Construction/Operation	✔		Limited data is available for freshwater macrophytes, and therefore are scoped in for both construction and operation as a precautionary measure. This is because they are sensitive to water quality impacts that could arise during both construction and operation phases.
INNS	Construction/ Operation	✔		Site clearance during construction and operation (decommissioning) activities could facilitate the spread of INNS in freshwater environments.
Marine				
Benthic Habitats and associated benthic communities	Construction/Operation	✔		Construction and operation activities could result in the loss, degradation or fragmentation of benthic habitats. This includes Priority Habitats, notably mudflats. Given the proximity of the Proposed Scheme, it is considered that the construction and operation activities could have potential impact to either the habitat itself or significant indirect effects to its setting. Construction activities could also result in the smothering of benthic communities. Operation activities could also result in water quality impacts and direct loss/degradation of habitat from vessel wave wash.

Element	Phase	Scoped In	Scoped Out	Justification
Phytoplankton	Construction/Operation		✔	Construction and operation activities could have water quality impacts by introducing pollutants and suspending sediments. Whilst this has the potential to impact phytoplankton communities, standard mitigation measures can be incorporated into the Proposed Scheme in relation to water quality to minimise impact to phytoplankton.
Marine Plants and Macroalgae	Construction		✔	Construction and operation activities could have water quality impacts by pollutants and suspending sediments. Whilst this has the potential to impact marine plants and macroalgae communities (which are of low value), standard mitigation measures can be incorporated into the Proposed Scheme in relation to water quality to minimise impact to macroalgae. No impact is anticipated on the Saltmarsh and native seagrass habitats during construction or operation due to the distance of these habitats from the Proposed Scheme
Fish	Construction/Operation	✔		Protected fish species, including migratory species, are known to be present in the Tees Estuary. Water quality impacts (pollutants and suspending sediments), and alterations to visual stimuli (artificial light spill) and the underwater soundscape during construction could result in direct harm and also cause disturbance/avoidance behaviours. Water quality impacts during operation could also impact fish species.
Marine mammals	Construction/Operation	✔		Harbour seals, grey seals and harbour porpoises are present within the Tees estuary. Alterations to visual stimuli (increased lighting), and the airborne and underwater soundscape from construction activities (notably piling) could incur physical harm, and avoidance/disturbance. Navigation during construction and operation could also result in vessel strikes.

Element	Phase	Scoped In	Scoped Out	Justification
				The remaining marine mammals recorded as present in the Greater North Sea Ecoregion (minke whale, bottlenose dolphin, white-beaked dolphin, orca, Atlantic white-sided dolphin, long-finned pilot whale, Risso's dolphin and short-beaked common dolphin) have been scoped out due to their unlikely presence in the Tees estuary and consequently vicinity of the Proposed Scheme.
INNS	Construction/Operation	✔		Vessel movements have the potential to provide a vector for the spread of INNS during construction and operation phase.

8.10. PROPOSED ASSESSMENT METHODOLOGY

8.10.1. The assessment methodology will be discussed with the Environment Agency and Local Authority to determine the environmental issues associated with freshwater and marine ecology. Some consultation has already been undertaken with Natural England via their Discretionary Advice Service (DAS) to discuss certain aspects of the marine and freshwater ecology assessment and help refine the scope. Furthermore, a PEA including a detailed desk study will be completed to inform the assessment of the Study Site and Proposed Scheme. These tasks will also facilitate the assessment of impacts of construction and operation of the Proposed Scheme.

8.10.2. The EIA assessment will be undertaken following the principles of EIA as set out by CIEEM's EIA guidelines (**Ref 8.22**) in addition to the approach detailed in **Chapter 3**: **Approach to EIA**. Each receptor will be evaluated within the geographic scale of reference and potential effects during the construction and operation phases of the Proposed Scheme.

8.10.3. The assessment of likely significant environmental effects as a result of the Proposed Scheme will consider both the construction and operational phases. The impact process involves:

- identifying and characterising impacts and their effects;
- incorporating measures to avoid and mitigate adverse effects;
- assessing the significance of any residual effects after embedded mitigation;
- identifying appropriate additional mitigation measures and any compensation measures to offset significant residual effects; and
- identifying opportunities for ecological enhancement.

8.10.4. For adverse impacts, CIEEM's Guidelines for Ecological Impact Assessment has been adapted to classify the magnitude of impacts using 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. 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.

8.10.5. Methods of prevention, minimising or mitigation of predicted impacts will be identified and addressed using these guidelines.

SIGNIFICANCE OF EFFECT CRITERIA

8.10.6. 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 7: Terrestrial Ecology** which aligns with CIEEM's Guidelines on Ecological Impact Assessment. Please see **Chapter 7: Terrestrial Ecology** for further details.

8.10.7. As described in **Chapter 3: Approach to EIA**, the effects will be defined as either 'Significant' or 'Not Significant'. Effects that are classified as moderate or above are 'Significant'. Effects classified as below moderate are considered 'not significant'.

OTHER ASSESSMENTS

Habitats Regulations Assessment

8.10.8. As the Site is located directly adjacent to the Teesmouth and Cleveland Coast SPA, there is considered to be the potential for likely significant effects on the ecological receptors that constitute the 'qualifying features' of these sites. As such, a Habitats Regulations Assessment (HRA) screening exercise will need to be undertaken to determine any likely significant effects resulting from the Proposed Scheme during either the construction or operational phases. HRA screening will be completed when sufficient environmental information has been gathered to accurately determined likely significant effects. Alongside the terrestrial ecology assessment, this will include information from the freshwater and marine ecology assessment, air quality assessment, and water environment assessment. It is expected that this information will be available following production of the PEIR.

8.10.9. If likely significant effects are identified (which is expected to be the case, as alluded to in **Section 8.8**), an Appropriate Assessment will then need to be carried out to examine these effects in more detail and determine appropriate mitigation measures in order to avoid any adverse effects on the Site integrity resulting from the Proposed Scheme.

8.10.10. In addition, although it doesn't specifically require assessment under the Habitats Regulations, due to the overlap in qualifying features and geographic coverage, the Teesmouth and Cleveland Coast Ramsar site will also be considered as part of the HRA.

8.10.11. Further details on the HRA process are provided in **Chapter 3: Approach to EIA**.

Biodiversity Net Gain Assessment

8.10.12. To determine the biodiversity value of the Site pre and post-development in a quantitative way, a BNG assessment will also be undertaken.

8.10.13. BNG is the end result of a process applied to development so that, overall, there is a positive outcome for biodiversity. This process follows the mitigation hierarchy, which sets out that everything possible must be done to firstly avoid, secondly minimise and thirdly restore/rehabilitate losses of biodiversity on a site. Only as a last resort, residual losses are compensated for, contributing towards local and national policies and strategies for conserving and enhancing biodiversity.

8.10.14. The BNG assessment will be based upon achieving compliance with current good practice principles, including measures such as avoiding areas of higher ecological value and achieving a measurable gain for biodiversity. Measurable gains will be calculated using the current version of the Defra Biodiversity Metric tool.

8.10.15. 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. The aim will be for the Proposed Scheme to achieve a 10% net gain in biodiversity post-development.

8.10.16. The BNG assessment is also discussed in **Chapter 3: Approach to EIA**

Water framework Directive Assessment

8.10.17. Potential impacts of the construction and operation phases on the WFD status of the relevant water bodies will be assessed in a standalone WFD assessment. A staged approach to undertaking a WFD assessment will be carried out, comprising Screening, Scoping and Impact Assessment. This approach will be adopted for the assessment of the Proposed Scheme, with the findings of the Screening and Scoping stages discussed with the EA prior to undertaking the Impact Assessment stage. The assessment will comprise a qualitative assessment supported by site walkover.

8.10.18. Further details on the Water Framework Assessment process are provided in **Chapter 9: Water Environment and Flood Risk.**

Further Surveys

8.10.19. The marine and freshwater receptors present have been identified as far as reasonably foreseeable at this stage, based on available information. However, as the assessment progresses and initial survey work is completed, the findings may reveal the need for further surveys to determine potential likely significant effects to ecological receptors more accurately. Any further survey requirements would be clearly highlighted following the completion of initial survey work.

8.10.20. In order to undertake a full assessment of the likely impacts of the Proposed Scheme on marine and freshwater biodiversity, additional surveys may be recommended following the PEA which are detailed below.

8.10.21. Proposed freshwater surveys may include, but are not limited to:

- Aquatic macroinvertebrate surveys on any suitable watercourses.
- Macrophyte surveys on any suitable watercourses.
- Electric fishing surveys on any suitable watercourses.
- eDNA sampling for fish on any suitable watercourses.
- Predictive SYstem for Multimetrics (PSYM) surveys on any suitable ponds.

8.10.22. If marine works are required, then further surveys may need to be required. The proposed surveys may include, but are not limited to:

- Intertidal Phase 1 Habitat Survey.
- Intertidal Phase 2 Core/Grab Sampling.
- Subtidal Grab Samples.
- Marine Mammal Surveys.

8.11. LIMITATIONS AND ASSUMPTIONS

8.11.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

8.11.2. Access to part of the Site is currently limited, and an aquatic ecology assessment PEA and further desk studies will be undertaken to gain a better understanding of the effects that are likely to occur due to the Proposed Scheme.

8.11.3. There is limited ecological data available on the freshwater and marine species that are found within the ZoI. Data has been extracted from nearby Environment Agency monitoring locations to try and gain an understanding of what species may be present within the Site. A PEA will be undertaken for all areas within the Site. Subject to this survey, it is anticipated that further specific surveys for invertebrates, fish and macrophytes will be carried out. Benthic ecology sampling and fish surveys may also be required, dependent on the detailed design.

8.11.4. 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 8.44**).

8.11.5. Survey data will provide a snapshot of the ecological baseline at the time of survey.

8.11.6. All information received and researched that facilitated this chapter is true at the time of writing.

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9. WATER ENVIRONMENT AND FLOOD RISK

9.1. INTRODUCTION

9.1.1. This chapter considers the impacts of the Proposed Scheme on the Water Environment (surface water, flood risk and groundwater) during the construction and operational phases and any potential significant effects. It sets out the proposed methodology for the Water Environment assessment and identifies those impacts that can be scoped out of the assessment. Where necessary, further assessment would be presented in the PEIR and ES. It considers all possible receptors within the Study Area including main rivers, ordinary watercourses, other surface water bodies such as lakes, groundwater waterbodies, groundwater Source Protection Zones (SPZ), groundwater and surface water abstractions and discharges, surface water and groundwater quality, the floodplain and risk of flooding (surface and groundwater) now and/or in the future.

9.1.2. This Chapter is intended to be read as part of the whole EIA Scoping Report with reference to:

- **Chapter 7: Terrestrial Ecology**;
- **Chapter 8: Freshwater and Marine Ecology**;
- **Appendix 9-A: Water Constraints Maps**;
- **Chapter 17: Geology and Soils**; and
- **Chapter 21: Cumulative Effects**.

9.2. CONSULTATION

9.2.1. An overview of consultation undertaken for the Proposed Scheme (to date) is summarised in **Table 9-1**.

Table 9-1 - Summary of consultation undertaken to date for Water Environment and Flood Risk

Body/Organisation	Date of Consultation	Key outcomes of discussion
Middlesbrough County Council / Stockton-on-Tees Borough Council / Environment Agency (EA) / Lead Local Flood Authority / Environmental Health Department of Stockton-on-Tees Borough Council	May 2023	A data request was submitted to provide information to support the baseline data review of this EIA Scoping Report. A response was not received prior to the completion of the EIA Scoping Report. Any data received will be considered in the PEIR.

Body/Organisation	Date of Consultation	Key outcomes of discussion
Natural England	8 June 2023	A Discretionary Advice Service (DAS) call was held with Natural England (NE) to confirm the approach to deliver the required nitrogen neutrality assessment and mitigation strategy (NNAMS). NE confirmed that the only off-site water discharge that should be considered in the NNAMS is the treated industrial process effluent discharged to Bran Sands wastewater treatment works (WWTW) for further treatment prior to being discharged to the River Tees. NE also confirmed that the nitrogen load calculation should be based on the total nitrogen discharge concentration (27mg/l) in treated effluent discharged from Bran Sands WWTW.

9.3. POLICY, LEGISLATION AND GUIDANCE

9.3.1. The policy, legislation and guidance relevant to the assessment of the Proposed Scheme is summarised in **Table 9-2**.

9.3.2. All relevant legislation, guidance and policies, and how they have been addressed within the EIA, will be presented in the ES.

Table 9-2 – Water Environment and Flood Risk - Summary of key Policy, Legislation and Guidance

Name of Policy / Legislation / Guidance	Description
Policy	
The 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. NPS EN-1 (paragraph 5.15.1) recognises that infrastructure "can have adverse effects on the water environment." It states that "these effects could lead to adverse impacts on health or on protected species and habitats and could, in particular, result in surface waters, groundwaters or protected areas failing to meet environmental objectives established under the Water Framework Directive."
The Draft Overarching NPS for Energy (EN-1) 2023 (**Ref 9.2**)	It needs to be noted that a draft revised EN-1 policy has been published for consultation which closes at the end of June 2023. The objective of the draft revised policy remains the same in relation to the water environment.
NPS for Renewable Energy Infrastructure (EN-3) 2011 (**Ref 9.3)**	Sets out the needs case for renewable energy and secondly to establish the specific criteria by which applications for development consent for such schemes are to be assessed.

Name of Policy / Legislation / Guidance	Description
The Draft NPS for Renewable Energy Infrastructure (EN-3) 2023 (**Ref 9.4**)	A draft revised EN-3 policy has been published for consultation which closes at the end of June 2023. The objective of the draft revised policy remains the same in relation to the water environment.
NPS for Electricity Infrastructure (EN-5) 2011 (**Ref 9.5**)	States that with regard to climate change, applicants should set out to what extent the proposed development is expected to be vulnerable and, as appropriate, how it would be resilient to flooding, particularly for substations that are vital for the electricity transmission and distribution network.
The Draft NPS for Electricity Infrastructure (EN-5) 2023 (**Ref 9.6**)	A draft revised EN-5 policy has been published for consultation which closes at the end of June 2023. The objective of the draft revised policy remains the same in relation to the water environment.
National Planning Policy Framework (2021) (**Ref 9.7**)	Sets out the Government's planning policy for England and how these should be applied. It provides a framework within which locally prepared plans can be produced.
Legislation	
Flood and Water Management Act 2010 (UK Parliament, 2010) (**Ref 9.8**)	Created role of Lead Local Flood Authority (LLFA) to co-ordinate local flood risk management, including review and approval of surface water management systems. Schedule 3 of the Act introduces National Standards for SuDS against which proposed drainage systems should comply.
Environmental Permitting (England and Wales) Regulations 2016 as amended (EA/DEFRA, 2018) (**Ref 9.9**)	States that it is an offence to knowingly permit a water discharge activity unless complying with an exemption or environmental permit. Also manage works that have the potential to affect a watercourse under the EA's jurisdiction.
Land Drainage Act 1991 (UK Parliament, 1991) (**Ref 9.10**)	Sets out the powers and duties held by Local Authorities associated with flood risk. Consent must be obtained for any works which may affect flow within an ordinary watercourse. Sets out responsibilities for maintenance to reduce flood risk.
The Water Resources Act (1991) (**Ref 9.11**)	The Water Resources Act regulates water resources, water quality and pollution, and flood defence. Part II of the Act provides the general structure for the management of water resources.
The Environment Act (2021) (**Ref 9.12**)	Part of a recent legal framework for environmental protection. Specifically targeting water quality and biodiversity enhancement.
The Water Environment (Water Framework Directive) (England and Wales) Regulations (2017) (**Ref 9.13**)	WFD Regulations provide a framework for managing the water environment in England through environmental objectives and a summary of the programmes of measures required to achieve those objectives.

Name of Policy / Legislation / Guidance	Description
Guidance	
The Groundwater (England and Wales) Regulations 2009 (UK Parliament, 2009) (**Ref 9.14**)	Introduces legislation on groundwater in England and Wales, provides rules on the granting of permits by the EA. Additionally, creates an offence for the discharge of hazardous substances or non-hazardous pollution without a permit.
Planning Practice Guidance (**Ref 9.15**)	Planning Policy Guidance (PPG) has been published online alongside the NPPF since 2014 to set out how certain policies should be implemented. The PPG for Flood Risk and Coastal Change (updated 2022) identifies how new developments must take flood risks into account and steer development to those areas at lowest risk. The PPG for Climate Change (updated 2019) sets out how climate change should be considered, including recommend increases in sea level rise, peak river flows and peak rainfall intensities.
EA's Approach to Groundwater Protection (2018) (**Ref 9.16**)	This document contains position statements providing information about the EA's approach to managing and protecting groundwater.
Guidance for Pollution Prevention (**Ref 9.17**)	These documents provide environmental good practice guidance for the whole UK
Planning Inspectorate Guidance Note 18: Water Framework Directive (2017) (**Ref 9.18**)	Inspectorate supports the preparation and submission of separate WFD assessment reports by Applicants, which clearly explain how the requirements of WFD have been met. These reports should be prepared in consultation with the EA.
Clearing the Waters for All (DEFRA, 2016) (**Ref 9.19**)	Guidance relating to assessment of impact of activity on coastal and estuarine waters, relating to the WFD. Key stages to be considered screening and scoping to identify potential at risk receptors.
Stockton Borough Council Local Plan 2019 (**Ref 9.20**)	In effect till 2032, the local plan brings in guides to planning with an effective framework for sustainable development. Sets out policies to ensure that all new development is energy and resource efficient.
Local Flood Risk Management Strategy (Stockton Borough Council, 2016) (**Ref 9.21**)	Aims to reduce the risk of flooding to residents and businesses and ensure that flood risk is managed in the most effective and sustainable way.
Strategic Flood Risk Assessment Level 1&2 (Stockton Borough Council, 2018) (**Ref 9.22**)	To form guidance through understanding flood risk sources and to investigate and identify the extent and severity of flood risk throughout the area.
Sustainable Drainage Systems (SuDS) Guidance (Tees Valley Authorities, 2019) (**Ref 9.23**)	Provides an overview into Sustainable Drainage Systems (SuDS) techniques and policy requirements whilst also highlighting specific local standards to be met to meet national standards.

Name of Policy / Legislation / Guidance	Description
Preliminary Flood Risk Assessment (Stockton Borough Council, 2011) (**Ref 9.24**)	Aimed at providing a high-level assessment of flood risk from local sources.
Non-Statutory Technical Standards for Sustainable Drainage Systems (2015) (**Ref 9.25**)	Sets out the core technical standards for SuDS proposed within England, including guidance on controlling flood risk.
Design Manual for Road and Bridges (DMRB) LA113 Road Drainage and the Water Environment (**Ref 9.26**)	Provides guidance on the assessment and management of impacts that road projects may have on the water environment.
CIRIA 697 The SuDS Manual, 2007 (**Ref 9.27**)	This guidance covers the planning, design, construction, and maintenance of SuDS.
CIRIA 532 Control of Water Pollution form Construction Sites (**Ref 9.28**)	This document provides guidance for the control of water pollution arising from construction activities. It focuses on the potential sources of pollution from within sites and the effective methods of prevention.
Natural England Water Quality and Nutrient Neutrality Advice (NE785) (**Ref 9.29**)	This sets out NE's advice for development proposals that have the potential to affect water quality in such a way that adverse impacts on designated habitats sites cannot be ruled out. This applies to the Proposed Scheme as discharges of nitrogen-containing effluent to the Tees catchment could adversely impact the Teesmouth and Cleveland Coast SPA and Ramsar site.

9.4. STUDY AREA

9.4.1. The Study Area has been defined as the Site being the area of the Proposed Scheme with a buffer of 1km from the Site for surface water features (including WFD water bodies) and flood risk and a 5km buffer from the Site for hydrogeology. The Study Area is shown on the Water Constraints Maps in **Appendix 9-A**. The Study Area also considers surface water features, flood risk receptors, groundwater waterbodies and water dependent conservation sites (surface and groundwater) that may be directly connected hydrologically to the Proposed Scheme. This is in line with DMRB Guidance LA113 Road Drainage and Water Environment (**Ref 9.26**). Although this guidance is applicable to road schemes, it is considered to provide a robust framework for the assessment of risks to the water environment.

9.4.2. The Study Area is unlikely to change significantly as the Proposed Scheme develops. If the footprint of the Proposed Scheme changes, any newly identified and affected receptors will be included in the buffers specified for surface water, flood risk and groundwater receptors.

9.5. BASELINE CONDITIONS

9.5.1. The following baseline information has been collated from the following sources:

- EA's online Flood Map for Planning[1];
- EA's online Flood Risk from Surface Water map[2];
- EA's online Flood Risk from Reservoirs map[3];
- EA's Recorded Flood Outlines map[4];
- EA's online Catchment Data Explorer (**Ref 9.30**);
- Ordnance Survey Mapping[5];
- Environment Agency LiDAR Digital Terrain Model[6];
- DEFRA 'Magic Map' online GIS portal[7];
- British Geological Survey (BGS) Geology of Britain Viewer[8];
- BGS GeoIndex online database[9];
- Flood Estimation Handbook Web Service[10];
- GroundSure Report (**Ref 9.31**);
- Groundworks Teesside (Former TV1 and TV2) Baseline Ground Investigation Factual Report (**Ref 9.32**); and
- Cranfield Soil and Agrifood Institute Soilscapes online mapping (**Ref 9.33**).

9.5.2. Ground Investigation (GI) works were completed between May 2018 and June 2018 by Geocore Site Investigations Limited (**Ref 9.32**) to identify ground and groundwater conditions, collect soil and groundwater samples for chemical analysis and obtain groundwater and gas monitoring data for the former Air Products TV1 and TV2 sites that lie within the Site for the Proposed Scheme (see **Chapter 2: Site and Proposed Scheme Description**). No additional GI is proposed for the Proposed Scheme.

9.5.3. This baseline section should be read in conjunction with the Water Constraints Maps (**Appendix 9-A**).

[1] https://flood-map-for-planning.service.gov.uk/. Accessed July 2023.
[2] https://flood-warning-information.service.gov.uk/long-term-flood-risk/map Accessed July 2023.
[3] https://flood-warning-information.service.gov.uk/long-term-flood-risk/map Accessed July 2023.
[4] https://data.gov.uk/dataset/16e32c53-35a6-4d54-a111-ca09031eaaaf/recorded-flood-outlines Accessed July 2023.
[5] https://osmaps.ordnancesurvey.co.uk/
[6] https://environment.data.gov.uk/DefraDataDownload/?Mode=survey
[7] https://magic.defra.gov.uk/MagicMap.aspx
[8] http://mapapps.bgs.ac.uk/geologyofbritain/home.html
[9] http://mapapps2.bgs.ac.uk/geoindex/home.html
[10] https://fehweb.ceh.ac.uk/GB/map

EXISTING BASELINE

Surface Water Features

9.5.4. A review of Ordnance Survey (OS) mapping indicates a large number of surface water features within the Study Area. These include a number of ponds and small watercourses/ditches, as well the River Tees and Holme Fleet.

9.5.5. The network of ditches and small watercourses are typical of low lying topography in tidal areas such as the Site. These are classified as ordinary watercourses under the jurisdiction of Stockton Borough Council and the relevant Lead Local Flood Authority (LLFA). The importance of these features is currently uncertain and will be further investigated during the site walkover to inform the PEIR. Many of these features are however in hydraulic connectivity with the Teesmouth and Cleveland Coast Ramsar site and SPA that encompasses the pond surrounded by the north-west of the Site boundary and (noting this is outside of the Site boundary) ponds to the west of the Site.

9.5.6. The River Tees flows along the southern boundary of the Site. The River Tees is a designated main river under the jurisdiction of the EA, and a WFD monitored transitional waterbody. At the location of the Site, the River Tees is tidally influenced. The River Tees flows into the North Sea approximately 4km north and downstream of the Site. The River Tees is designated as a SSSI and SPA.

9.5.7. The River Tees is classified as a WFD water body and is monitored against the objectives of the WFD as a Transitional and Coastal Water (TraC) body. The downstream extents of the River Tees as it flows through the Study Area is referenced in the EA's Catchment Data Explorer as the Tees Water Body (GB 510302509900). The section of coastline at the outfall of the River Tees to the North Sea is also monitored against the objectives of the WFD as a TraC and is referenced in the EA's Catchment Data Explorer as The Tees Coastal Water Body (GB 650301500005). These water bodies are defined as TraC respectively and both are described as heavily modified. The EA undertakes periodic monitoring of WFD waterbodies and publishes on the EA's Catchment Data Explorer. Cycle 3 (2019) monitoring awards ecological status as Moderate and chemical status as Fail to both the Tees Water Body and The Tees Coastal Water Body. Cycle 3 (2019) is an update in classification for all water bodies following on from the Cycle 1 and Cycle 2 classification rounds. Multiple reasons are listed for not achieving Good status:

- Poor nutrient management – Tees Water Body;
- Contaminated water body bed sediments – Tees Water Body;
- Sewage and trade/industry discharge – Tees Water Body;
- Physical modification associated with ports and harbours, coastal squeeze and recreation – Tees Water Body and The Tees Coastal Water Body; and
- Elevated levels of Polybrominated diphenyl ethers (PBDE) and Mercury and its compounds – Tees Water Body and The Tees Coastal Water Body.

9.5.8. Holme Fleet is located to the south-west of the Site. It flows in open channel through the Saltholme Nature Reserve to the west of the Site and is assumed to enter a culvert beneath the disused railway that is located to the south of the Site boundary. From here the watercourse is culverted under the southern part of the Site and flows from west toeast before it discharges to the River Tees. Holme Fleet is a designated main river under the jurisdiction of the EA.

Designated Sites

9.5.9. The following designated areas related to surface water environment were identified within the Study Area:

- River Tees is a designated SSSI and SPA. The area along the channel of the River Tees between Clarence Wharf and the existing jetties at North Tees Works is a designated Ramsar site; and
- Dorman's Pool and Saltholme East and West Pools located immediately to the west of the Site, as well as land to the west and north-west of the Site, are part of the designated Teesmouth and Cleveland Coast Ramsar site.

9.5.10. There are a number of nature reserves within the Study Area which have been classified as SPAs and SSSIs . These nature reserves are located immediately to the west and north-west of the Site and are under the protection of the Royal Society for the Protection of Birds (RSPB). These nature reserves include:

- Dorman's Pool Nature Reserve;
- Saltholme Nature Reserve, which includes:
  - Saltholme East Pool Nature Reserve;
  - Saltholme West Pool Nature Reserve; and
  - Paddy's Pool Nature Reserve.

9.5.11. In addition, the following designated sites were identified outside of the Surface Water Study Area but in hydraulical connectivity with the Site:

- Teesmouth National Nature Reserve (NNR) – located approximately 2km downstream of the Site; and
- Seaton Dunes and Common SSSI and Local Nature Reserve (LNR) – located approximately 4.5km downstream of the Site.

9.5.12. The designated sites related to the Water Environment and located in the Study Area are shown in Figure 9-1 of **Appendix 9-A**.

Nitrogen Neutrality

9.5.13. NE's advice to the LPA regarding nutrient neutrality (Ref 9.29) applies to developments that could affect water quality in such a way that adverse impacts on designated habitats sites cannot be ruled out. Habitats sites are defined as SACs, SPAs and Ramsar sites.

9.5.14. The baseline condition of the Teesmouth and Cleveland Coast SPA and Ramsar site is adversely affected by nitrogen enrichment.

9.5.15. In accordance with NE's advice to the LPA regarding nutrient neutrality, the Proposed Scheme must achieve nitrogen neutrality to avoid any worsening of the existing condition of the Teesmouth and Cleveland Coast SPA/Ramsar site.

Existing Drainage

9.5.16. Information on the existing drainage serving the area of the Proposed Scheme is limited. A review of the Landis Soilscapes mapping shows that the entire Site is underlain by loamy and clayey soils of coastal flats with naturally high groundwater. This information suggests that infiltration techniques are unlikely to be feasible in the area of the Site. Considering this information, it is therefore assumed that the existing surface water drainage system serving the Site eventually discharges to the nearby watercourses and the River Tees.

Existing Surface Water Discharge and Abstraction Consents

9.5.17. Information on existing public and private surface water discharge and abstraction consents within 1km of the Site boundary was requested from the LLFA, EA and Stockton-on-Tees Borough Council. The information was not received at the time of writing this Scoping Report. Information received from these authorities will be considered in the PEIR and ES.

Groundwater

9.5.18. The main characteristics of the geology (superficial and bedrock) that underlies the Proposed Scheme are described in **Chapter 17: Geology and Soils** and considers both published information and the findings of the historical ground investigation works. The geology underlying the Study Area is shown in Figure 9-2 and Figure 9-3 of (**Appendix 9-A**).

9.5.19. Superficial deposits, within the Site, comprising Tidal Flat Deposits are low productivity aquifers of limited or local potential, where borehole yields are expected to be small. The EA designated the Tidal Flat Deposits as Secondary (undifferentiated) aquifers assigned in cases where it is not possible to attribute either a category A or category B aquifer designation to the rock type.

9.5.20. Bedrock geology comprising the Mercia Mudstone Group and Sherwood Sandstone Group are designated Secondary B and Principal aquifers respectively by the EA. Principal aquifers are deemed capable of supporting water supplies at a regional scale meaning they usually provide a high level of water storage. They may also support water supply and/or river baseflow on a strategic scale. Secondary B aquifers are predominantly lower permeability layers which can store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons, and weathering. They are generally the water-bearing parts of the former non-aquifers.

9.5.21. Ground Investigation (GI) works were completed in 2018. The purpose of these works was to investigate ground conditions and assess the contamination status of the former Air Products TV1 and TV2 sites that lie within the Site for the Proposed Scheme (**Chapter 2: Site and Proposed Scheme Description**). Sixteen exploratory boreholes were drilled and installed for the purpose of assessing ground gases and groundwater monitoring targeting shallow and deep groundwater within the superficial Tidal Flat Deposits (specifically sand lithology). Groundwater level monitoring was undertaken on three occasions between 19 June 2018 and 12 July 2018. A summary of groundwater monitoring data is provided in **Table 9-3** below. Groundwater levels were relatively shallow and encountered between 4 and 5 mbgl (metres below ground level) in all locations.

Table 9-3 - Average depth to groundwater level (mbgl / mAOD) from 2018 GI

Borehole ID	Well Screen (mbgl)	Screened Strata	Average Groundwater Level (mbgl)	Average Groundwater Level (mAOD)
BH01-18	3.0 - 5.5	Made Ground	4.65	1.29
BH02-18	6.3 - 9.0	Sand	4.77	1.29
BH05-18	2.1 - 5.1	Made Ground	4.53	1.46
BH06-18	2.0 - 5.1	Made Ground	4.52	1.48
BH07-18	3.5 - 6.5	Made Ground	4.86	1.13
BH10-18	3.0 - 5.7	Made Ground	4.54	1.52
BH12-18	3.0 - 6.0	Made Ground	4.56	1.42
BH13-18	4.0 - 10.0	Made Ground	4.43	1.51
BH17-18	1.0 - 5.0	Made Ground	4.45	1.58
BH09-18	6.5 - 8.5	Sand	4.66	1.35
BH23-18	3.0 - 5.5	Made Ground	4.34	1.36
BH24-18	6.3 - 9.0	Made Ground	4.27	1.45
BH25-18	2.1 - 5.1	Made Ground	4.24	1.53

Borehole ID	Well Screen (mbgl)	Screened Strata	Average Groundwater Level (mbgl)	Average Groundwater Level (mAOD)
BH26-18	2.0 - 5.1	Made Ground	4.13	1.58
BH21-18	5.5 - 8.5	Sand	4.49	1.33
BH22-18	3.3 - 7.3	Made Ground & Sand	4.42	1.35

Table notes –mAOD denotes metres above ordnance datum. No groundwater level monitoring has been undertaken within bedrock geology (Mercia Mudstone Group and Sherwood Sandstone Group).

9.5.22. Local BGS boreholes from the BGS GeoIndex Online Database provide indicative records for ground conditions (including depth to superficial/bedrock geology and groundwater level) for the Proposed Scheme. BGS borehole NZ52SW478 (NGR 453240 522990), which is at the location of the existing jetty, records a total thickness of 31.44m for superficial deposits and a thickness of up to 90m for the Mercia Mudstone Group. BGS borehole NZ52SW479 (NGR 451040 523340), which is located along the proposed pipeline corridor to the north-west of the Site records groundwater level at 41mbgl (approx. -39.6mAOD) and depth to the Principal Sherwood Sandstone Group aquifer at 32.9mbgl.

9.5.23. Regional groundwater flow is likely to occur in the deep bedrock aquifer (Sherwood Sandstone Group). Groundwater flow in the deep bedrock aquifer is not generally in continuity with shallow groundwater. Local groundwater flow will likely be in a south-easterly direction from the Site towards the River Tees, which is likely hydraulically connected to shallow groundwater within superficial deposits.

9.5.24. The groundwater vulnerability map shows the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a single square kilometre. The Tidal Flat Deposits are designated as Medium to High groundwater vulnerability which means that these units can transmit pollution to groundwater easily.

9.5.25. The Study Area does not fall within a SPZ. SPZs are defined around large public potable groundwater abstraction sites. The purpose of SPZs is to provide additional protection to safeguard drinking water quality and forms part of an initial screening process in assessing impacts to groundwater resources. The closest SPZ is approximately 9km northwest of the Site at Dalton Piercy and based on the geology of the area, the abstraction is inferred to target the Sherwood Sandstone Group and/or Ford Formation.

9.5.26. Three groundwater abstractions are identified on Site and seven groundwater abstractions within 50m of the Site. Details are summarised in **Table 9-4** below and on Figure 9-7 **of Appendix 9-A**.

Table 9-4 - Summary of groundwater abstractions for the Proposed Scheme

Licence No. & Owner	Status	Annual Volume (m3)	Max Daily Volume (m3)	Target Aquifer	Distance from Site
1/25/04/164 C Chemicals and Polymers Ltd	Historical	Unknown	Unknown	Mercia Mudstone Group	On Site
1/25/04/164 C Chemicals and Polymers Ltd	Historical	450000	1500	Mercia Mudstone Group	On Site
1/25/04/164 C Chemicals and Polymers Ltd	Active	450000	1500	Mercia Mudstone Group	On Site
1/25/04/068 C Ltd	Historical	2954545	9591	Mercia Mudstone Group	7m north-west of the Site
1/25/04/134 C Chemical and Polymers Group	Historical	Unknown	Unknown	Unknown	7m north-west of the Site
1/25/04/134 Huntsman Petrochemicals (UK) Ltd	Historical	1800000	6478	Sherwood Sandstone Group	7m north-west of the Site
1/25/04/134 Huntsman Petrochemicals (UK) Ltd	Historical	1800000	6478	Sherwood Sandstone Group	7m north-west of the Site
1/25/04/134* Sabic UK Petrochemicals	Active	1800000	6478	Sherwood Sandstone Group	7m north-west of the Site

Table notes
* three abstractions under the same licence no. and owner targeting the Principal Sherwood Sandstone Group aquifer. Annual and maximum daily volumes (m3) are the same for all abstractions under specified licence.

On Site identifies that the groundwater abstraction is within the Proposed Scheme boundary.

9.5.27. Under the WFD, the EA has determined the Site lies within the Tees Sherwood Sandstone and Tees Mercia Mudstone and Redcare Mudstone groundwater waterbodies (WFD Groundwater Body ID GB 40301G702000 and GB 40302G701300 respectively) which is classified as holding Good and Poor overall status, respectively based on the 2019 (Cycle 3) dataset (Figure 9-8 of **Appendix 9-A**). Both groundwater bodies are protected under the Drinking Waters Directive (**Ref 9.29**).

9.5.28. **Table 9-5** provides a summary of groundwater water quality data available from the 2018 GI (**Ref 9.32**). Minimum and maximum values of these parameters for all samples are provided. No additional GI works are proposed to obtain additional baseline data to support pre-construction (refer to **Chapter 17: Geology and Soils**) where data available for the Proposed Scheme is considered acceptable and consultation with both the EA and Local Authority is currently underway for additional groundwater water quality data and groundwater level monitoring data that will feed into the PEIR and ES.

Table 9-5 - Groundwater water quality data from 2018 GI

Determinant	No of Samples	Minimum measured concentration	Maximum measured concentration
pH - (pH Units)	16	7.5	10.7
Total Cyanide (µg/l)	16	<10	82
Free Cyanide (µg/l)	16	<10	10
Total Sulphate as SO4 (mg/l)	16	77300	7320000
Chloride (mg/l)	16	77.3	7320
Ammoniacal Nitrogen as N (µg/l)	16	19	8900
Dissolved Organic Carbon (DOC)	16	530	640000
Alkalinity (mgCaCO3/l)	16	2.12	93.3
Hardness – Total (mgCaCO3/l)	16	<3	1700
Speciated PAHs (µg/l)	16	<0.01	<0.01

Determinant	No of Samples	Minimum measured concentration	Maximum measured concentration
Speciated Total EPA-16 PAHs (µg/l)	16	<0.16	<0.16
Arsenic (dissolved) (µg/l)	16	0.15	16.8
Cadmium (dissolved) (µg/l)	16	0.02	0.17
Chromium (hexavalent) (µg/l)	16	43	560
Chromium (dissolved) (µg/l)	16	<5	5
Copper (dissolved) (µg/l)	16	0.2	1.3
Lead (dissolved) (µg/l)	16	0.5	5
Mercury (dissolved) (µg/l)	16	<0.2	3.5
Nickel (dissolved) (µg/l)	16	7.3	1000
Selenium (dissolved) (µg/l)	16	<0.05	0.09
Zinc (dissolved) (µg/l)	16	<0.5	6.4
Calcium (dissolved) (µg/l)	16	2.9	40
Magnesium (dissolved) (µg/l)	16	<0.5	9.1
BTEX (µg/l)	16	<1.0	<1.0
Individual Speciated Polyaromatic Hydrocarbons (PAHs) (ug/l)	16	<0.01	<0.01
Speciated Total EPA-16 PAHs (µg/l)	16	<0.16	<0.16
Total Petroleum Hydrocarbons (TPH) (µg/l)			
TPH-CWG - Aliphatic >EC5 - EC6 to >EC8 - EC10	16	<1.0	<1.0

Determinant	No of Samples	Minimum measured concentration	Maximum measured concentration
TPH-CWG - Aliphatic >EC10 - EC12 to >EC21 - EC35, EC5 - EC35	16	<10	<10
TPH-CWG - Aromatic >EC5 - EC7 to >EC8 - EC10	16	<1.0	<1.0
TPH-CWG - Aromatic >EC10 -EC12 to >EC21 - EC35, EC5 -EC35	16	<10	<10
Individual VOCs (µg/l) Except:	16	<1.0	<1.0
Vinyl Chloride	16	<1.0	361
1,1-Dichloroethene	16	<1.0	6.2
1,2-Dichloroethane	16	<1.0	89.6
Individual SVOCs (µg/l) Except:	16	<0.05	<0.05
Bis(2-chloroethyl)ether	16	<0.05	6500

9.5.29. Full details of groundwater chemical analysis, testing and sediment sampling are provided in **Chapter 17: Geology and Soils**.

FLOOD RISK

Risk of Flooding from Fluvial and Tidal Sources

9.5.30. A review of the EA's Flood Map for Planning shows that the majority of the Site is located in the low-risk Flood Zone 1. However, the west, north-west and easterly regions of the Site are shown to be located partially within Flood Zones 2 and 3. The majority of flooding outside of the Site boundary but within the Study Area is limited to the Saltholme Nature Reserve to the west and north-west of the Site. The A178 Seaton Carew Road, A1185 and A1046 (including adjacent properties and a primary school at High Clarence and the Docks) are also located in Flood Zones 2 and 3.

9.5.31. The definition of the Flood Zones is as follows:

- Flood Zone 1 is described as land with less than a 1 in 1000 annual probability of flooding from fluvial or tidal sources;

- Flood Zone 2 is described as land having between a 1 in 100 and 1 in 1000 annual probability of fluvial flooding, or between a 1 in 200 and 1 in 1000 annual probability of tidal flooding; and
- Flood Zone 3 is described as land having a 1 in 100 or greater annual probability of fluvial flooding, or a 1 in 200 or greater annual probability of tidal flooding.

9.5.32. The source of the identified flood risk within the Site is currently unknown and will be investigated further to inform the PEIR, ES and supporting Flood Risk Assessment (FRA). Given the Site's proximity to the River Tees it is considered likely that flooding may be tidally dominated, particularly in the east of the Site where flooding is likely to be directly attributable to the River Tees. The source of flooding in the west and north-west of the Site appears to be likely attributed to the network of watercourses and ditches, although these may still be tidally dominated from the effects of the River Tees.

9.5.33. The extent of flood zones in the Site is shown on Figure 9-4 of **Appendix 9-A**.

Risk of Flooding from Surface Water

9.5.34. A review of the EA's Flood Risk from Surface Water mapping shows small, isolated areas within the Site which are indicated to be at low to high susceptibility to flooding from surface water. These areas are likely to be associated with the locally low ground where water would pond after intense or prolonged rainfall events.

9.5.35. The areas susceptible to flooding from surface water are shown in the Water Constrains map in Figure 9-5 of **Appendix 9-A**.

Risk of Flooding from Reservoirs

9.5.36. A review of the EA's Flood Risk from Reservoirs mapping shows that the north-east and west of the Site is at risk of flooding from reservoirs should a failure such as breach of reservoir occur when there is also flooding from rivers. The mapping indicates that the flood extents would be similar to those predicted for fluvial and tidal sources as discussed above. The source of reservoirs flooding is uncertain and will be investigated further to inform the PEIR, ES and supporting FRA.

9.5.37. Extent of the area indicated to be at risk of flooding from reservoirs is shown in the Water Constraints map in Figure 9-6 of **Appendix 9-A**.

Risk of Flooding from Groundwater

9.5.38. Groundwater flooding is caused by the emergence of water from beneath the ground, either at point or diffuse locations. There are several mechanisms that increase the risk of groundwater flooding including prolonged rainfall, high in-bank river levels, artificial structures, groundwater rebound and mine water rebound. The majority of the Site is classified as having a low risk to groundwater flooding attributed to the low permeability Mercia Mudstone Group. The western boundary of the Site (towards

Seaton Carew Road) is classified as having high risk to groundwater flooding attributed to the permeable Sherwood Sandstone Group.

FUTURE BASELINE

Surface water features

9.5.39. The main aim of the WFD is for designated waterbodies to achieve Good overall status. The waterbodies identified within the Study Area are currently not achieving this objective. Review of the EA's Catchment Data Explorer indicates that this may not be achievable for the Tees Water Body due to disproportionate costs and unfavourable balance of costs and benefits, however improvement to achieve Good status for certain quality elements such as Fish, Invertebrates and Chemical is proposed.

Groundwater

9.5.40. Based on the current available information for the Site, no changes are expected in the baseline conditions for groundwater. However, due to climate change a marginal increase (due to increased rainfall/stormfall events) in groundwater resource (aquifers and groundwater bodies) is expected but occasionally increased stresses (i.e. supply/demand for water supply) on groundwater resources due to drought severity exacerbated by climate change will be expected.

9.5.41. Data regarding groundwater abstractions was not received through consultation in time for the completion of this EIA Scoping Report. The future baseline cannot be established in detail at this stage but will be provided to inform the PEIR and ES.

Flood risk

9.5.42. The Site is located within areas identified to be at fluvial and/or tidal flood risk. The most significant change in the future baseline condition is therefore likely to be associated with an increase in sea level and peak river flows associated with the potential effects of climate change. In addition, increased rainfall associated with climate change could increase surface water runoff that could result in increased risk of flooding in the future.

9.5.43. The impacts of climate change on the risk of flooding will be assessed as part of the PEIR, ES and supporting FRA.

9.6. SENSITIVE RECEPTORS

9.6.1. The sensitive receptors relevant to the Water Environment (surface water, flood risk and groundwater) identified for this assessment are presented in **Table 9-6** along with their indicative importance classification. The importance of the receptors was determined based on the methodology provided in DMRB Volume 11 Section 3 Part 10 (LA 113) (**Ref 9.26**); although this guidance is applicable to road schemes it is considered to provide a robust framework for the assessment of risks to the water

environment. The importance classification criteria are set out in **Table 9-8** of this chapter.

9.6.2. Assessment of importance of a sensitive receptor is essential as it influences the assessment of the significance of effects on a receptor.

9.6.3. The importance indicated below may change during preparation of the PEIR following future data collection and consultation with the relevant authorities. Any changes to sensitive receptors and/or their importance will be reported in the PEIR and the ES.

Table 9-6 - Water environment attribute and importance

Potential Receptor	Importance	Justification
River Tees	Very High	Designated main river. WFD monitored water body. Designated SSSI, Ramsar and SPA (marine components). It flows along the Site boundary. The Teesmouth and Cleveland Coast SPA and Ramsar site triggers the requirement for nutrient neutrality.
North Sea / Tees Coastal Water Body	High	WFD monitored water body. North Sea and Tees Coastal Water Body is adjacent to the Site Boundary and it is in hydraulic connectivity with the Site.
Holme Fleet	High to Very High	Designated main river. Flows through adjacent Nature Reserves and areas designated as SSSI and Ramsar upstream of the Site. Open channel section is located within the Surface Water Study Area. The river is culverted under the south of the Site. Not monitored against WFD objectives.
Ordinary watercourses and drains	Low to High	Ordinary watercourses located within the Site Boundary and in the Surface Water Study Area. Ecological value currently uncertain. Flow through adjacent Nature Reserves and areas designated as SSSI and Ramsar.
Teesmouth National Nature Reserve	Very High	Located approximately 2.5km downstream of the Site. Although it is located outside of the Surface Water Study Area, it is hydraulically connected to the Site. Also designated as SSSI and Ramsar.
Ponds located in designated areas including Dorman's Pool, Saltholme East Pool, Saltholme West Pool and Paddy's Pool	Very High	Located in areas designated as SSSI and Ramsar. Ponds are located within the Surface Water Study Area.

Potential Receptor	Importance	Justification
Ponds not located in designated areas	Low to Medium	Ponds of unknown quality located both within the Site and in the Surface Water Study Area.
Proposed Scheme	Medium	In accordance with Annex 3 of the NPPF, facilities such as the Proposed Scheme would be classified as a waste management facility, which is classified as Less Vulnerable. Vulnerability classification to be agreed with the EA and Local Authority, but could be considered.
People, property and infrastructure in the surrounding area	Medium to Very High	Flood risk receptors within the Study Area include industrial premises, marine docks infrastructure, residential development, school facilities and roads likely to be required for mass evacuation.
Sherwood Sandstone Group (Principal bedrock aquifer)	Very High	Forms part of the regional aquifer system (Tees Sherwood Sandstone WFD waterbody ID GB40301G702000) designated under the WFD as being Good status (WFD Cycle 3 2019). Supports major public water supply abstraction licences in the area (approx. 9km north of the Proposed Scheme).
Mercia Mudstone Group (Secondary B bedrock aquifer)	Medium	Forms minor aquifer discontinuous to underlying bedrock system (Mercia Mudstone and Redcare Mudstone WFD waterbody ID GB 40302G701300). Where permeable sandy strata exist (skerries), limited quantities of groundwater suitable for domestic or small-scale agricultural use are obtainable.
Tidal Flat Deposits (Secondary Undifferentiated superficial deposit aquifer)	Medium	Superficial deposit aquifer not considered a target for local water supply but considered to be in hydraulic connectivity with the River Tees and may provide base flow to designated sites within the Study Area.
Public Water Supply Abstraction	Very High	Drinking water abstraction licence (1/25/04/183) identified approx. 600m southwest from the Site targeting the Sherwood Sandstone Group (Principal aquifer). No SPZ designation but maximum daily volume is 546m3/d.
Private (unlicenced) groundwater abstractions	High	Three groundwater abstraction licences (>20m3/d) are located within the Site boundary targeting the principal bedrock aquifer (Sherwood Sandstone Group). It is unclear if these abstractions are still in use (active) from

Potential Receptor	Importance	Justification
		the available information. For the purposes of the EIA, these abstractions are considered active.
Groundwater Dependent Terrestrial Ecosystems (GWDTE)	High	SSSI / Ramsar designation located within the Study Area. It is unclear from the available information at this stage if these sites are hydraulically connected to groundwater and thus designated a GWDTE.

9.7. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

DESIGN MEASURES

9.7.1. To mitigate potential impacts during the construction and operational phases, a robust surface water drainage system, including appropriate pollution prevention measures, will be provided to ensure discharge from the Proposed Scheme does not pose a risk to the water quality of surface water and groundwater receptors and does not increase flood risk to the Proposed Scheme or elsewhere.

9.7.2. The Proposed Scheme will also incorporate appropriate flood resilience and management measures to ensure that the operation of the Proposed Scheme and safety of Site users during a flood event is integral to the design development of the Proposed Scheme. This will be discussed and detailed in the ES and supporting FRA. The flood evacuation plans available for the existing TV1/TV2 sites will also be considered as part of the design.

9.7.3. This section will be revised during the preparation of the PEIR and ES once further details of the Proposed Scheme are available.

9.7.4. Mitigation measures required for any potential detailed WFD assessment cannot be anticipated at this stage as they depend on the outcome of the WFD screening and scoping assessment. However, if mitigation measures are required, these will be discussed in a detailed WFD assessment at the later stage of the project.

MITIGATION MEASURES

Construction Phase

9.7.5. The assessment of potential impacts to the Water Environment may identify the need for a Flood Risk Activities Permit (FRAP) prior to construction works commencing in areas at flood risk; it is not proposed to submit a FRAP as part of the DCO application as there is unlikely to be sufficient construction information available at the time of the DCO submission. However, obtaining a FRAP will be considered as an embedded mitigation measure.

9.7.6. A Code of Construction Practice (CoCP) will be prepared for the works that will include method statements for the proposed works and details of materials to be

used. The full CoCP will contain measures to protect both surface and groundwater quality, and other water resource aspects. A draft CoCP will be included with the Application documents. Examples of mitigation measures which will be implemented include, but are not limited to, the following:

- Appropriate pollution prevention measures will be applied during all construction activities;
- Construction time will be minimised as far as practical; and
- Appropriate construction techniques will be used to minimise potential impact on the surface water and groundwater resources.

9.7.7. Special focus will be given to determining potential/plausible risks from the Proposed Scheme, on public and private (non-licenced) groundwater abstractions, Principal aquifers, Secondary B aquifers, Secondary (undifferentiated) aquifers and GWDTE that may be directly or indirectly impacted by the Proposed Scheme, and then quantifying these risks. If necessary, as the design evolves, additional measures may be incorporated into the Proposed Scheme to mitigate any unacceptable risks identified to the groundwater resources.

9.7.8. Surface water runoff generated in the area of the Proposed Scheme is likely to contain high levels of sediment, hydrocarbons and (potentially) other harmful chemicals that can pollute surface water and groundwater features through direct migration or via the surface water drainage system. The contractor will be required to implement an appropriate construction phase surface water management strategy to meet the requirements of the LLFA and EA. Appropriate pollution prevention measures will be incorporated in the proposed surface water management strategy to minimise the risk of pollution to both surface water and groundwater resources.

9.7.9. This section will be revised during the preparation of the PEIR and ES once further details of the Proposed Scheme are available.

Operational Phase

9.7.10. The Proposed Scheme has the potential to increase the amount of impermeable area and surface water runoff generated in the Site, which in turn has the potential to increase the risk of flooding from surface water runoff to the properties and people in the Study Area.

9.7.11. The treated industrial effluent discharged to Bran Sands WWTW from the Proposed Scheme will increase the nitrogen load discharged to the Teesmouth and Cleveland Coast SPA and Ramsar site. This will be mitigated through the conversion of existing agricultural land to a land use that generates lower nitrogen emissions to the water environment.

9.7.12. Potential mitigation measures will be reviewed during the preparation of the PEIR and ES once further details of the Proposed Scheme are available.

Decommissioning Phase

9.7.13. There are no mitigation measures currently designed for the decommissioning phase of the Proposed Scheme. Potential mitigation measures will be reviewed in the PEIR and ES once further details in relation to decommissioning of the Proposed Scheme are available.

ENHANCEMENT MEASURES

9.7.14. There are no enhancement measures currently designed for the Proposed Scheme. Enhancement opportunities are likely to become apparent as the Proposed Scheme progresses and will be reviewed further in the PEIR and ES.

9.8. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

9.8.1. During construction, it is considered likely that significant effects to surface water features, groundwater features and flood risk could arise from:

- Increased pollution risks from spillage of fuels or other harmful substances that may spill directly into or migrate to surface water and groundwater receptors and aquifers;
- Increased pollution risk from sedimentation caused by surface water runoff from areas of bare earth, construction materials such as aggregate, stockpiles of topsoil or discharge of groundwater dewatering;
- Direct impact to watercourses or other surface water features associated with required watercourse crossings, diversions or other physical modifications;
- Impact to quality attributes and WFD classification of the River Tees – Two options for the marine transport infrastructure are considered at this stage. Option 1 relates to the existing Wilton Engineering Wharf and includes removal of ancillary buildings. Option 2 relates to the existing Clarence Wharf and may require reinforcement works to the existing wharf, including additional piling or top slab reinforcement. The potential piling works proposed for Option 2 may disturb bed material, river bank and marine habitats;
- Direct impact or changes to groundwater aquifers and groundwater supported public and private water supplies, either within the footprint of the Proposed Scheme or as a result of changes to groundwater flows and levels associated with dewatering activities and foundation excavations or piling into the aquifer for intermediate feedstock storage and navigator rail terminal;
- Loss or changes to GWDTEs either within the footprint of the Proposed Scheme as a result of severance of habitat or as a result of changes to groundwater flows and levels associated with dewatering activities;
- Increased flood risk to construction workers, and people, property and infrastructure located as well in the Site boundary and the Surface Water Study

Area as in the area expanding beyond the Surface Water Study Area associated with temporary works within existing floodplain.

OPERATION PHASE

9.8.2. During operation, it is considered likely that significant effects to surface water features, groundwater features and flood risk could arise from:

- Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals that may migrate or be discharged to surface water features or groundwater resources via the proposed drainage system;
- The discharge of treated industrial process effluent to the River Tees (via Bran Sands WWTW), increasing the nitrogen load discharged to the Teesmouth and Cleveland Coast SPA and Ramsar site;
- Impact to quality attributes and WFD classification of the River Tees associated with the potential works to the Clarance Wharf;
- Increased rates and volumes of surface water runoff from an increase in impermeable area leading to a potential increase in flood risk.
- Increased flood risk to people, property and infrastructure located in the Site and the Surface Water Study Area from changes to flood flow conveyance and storage.
- Flood risk to the Proposed Scheme from construction of the Proposed Scheme in areas identified to be at risk of flooding.

DECOMMISSIONING PHASE

9.8.3. Potential impacts that may arise during the decommissioning phase are considered to be the same as discussed above for the construction phase.

ELEMENTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

9.8.4. **Table 9-7** below summarises scoped in and scoped out elements based on professional judgement and the information available at the time of preparing this Scoping Report. These elements will be revised while the design progresses and updated if needed.

Table 9-7 - Elements Scoped in or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Quality of surface water resources	Construction, Operation and Decommissioning	✔		Construction and decommissioning works have the potential to impact the quality of the surface water resources from increased pollution risk and any potential works to surface water features. The methodology of

Element	Phase	Scoped In	Scoped Out	Justification
				construction and details of the proposed works are uncertain at this stage. Operation of the Proposed Scheme has the potential to pose risk to the quality of the surface water resources from routine runoff and spillage. Details of operational activities are uncertain at this stage.
Nutrient neutrality	Operation	✔		The discharge of nitrogen-containing treated industrial process effluent to the River Tees (via Bran Sands WWTW) will increase the nitrogen load discharged to the Teesmouth and Cleveland Coast SPA and Ramsar site. A nitrogen neutrality assessment and mitigation strategy (NNAMS) will be required to demonstrate that neutrality can be achieved.
Flood risk to adjacent receptors and Proposed Scheme	Construction, Operation and Decommissioning	✔		Construction, operation and decommissioning of the Proposed Scheme may temporarily or permanently reduce the capacity of the existing floodplain storage and/or impact the existing flood flows.
Flood risk to adjacent receptors and Proposed Scheme	Operation	✔		Operation of the Proposed Scheme has the potential to increase the amount of impermeable area resulting in an increased rate and volume of surface water runoff generated in the Site that may increase the risk of flooding in the Surface Water Study Area or elsewhere.
Groundwater Flood Risk	Construction, Operation and Decommissioning	✔		There is the potential for increased groundwater flooding susceptibility e.g. from intrusive works and/or construction of groundwater flow barriers (piling works) at specific locations for the Proposed Scheme at construction, operation and decommissioning phases.

Element	Phase	Scoped In	Scoped Out	Justification
Groundwater Abstractions (private and licenced)	Construction	✔		There is the potential for direct physical impacts based on Proposed Scheme. Known abstractions (to date) are within the Site boundary and may be impacted during construction (groundwater quality and flow).
Groundwater Levels and Flows	Construction, Operation and decommissioning	✔		There is the potential for direct physical impacts to Secondary A aquifer (Tidal Flat Deposits) based on available information for the Proposed Scheme.
GWDTE	Construction, Operation and Decommissioning	✔		There is the potential for indirect impacts to designated sites (Teesmouth and Cleveland Coast SSSI and Ramsar, and on-site SPA) based on available information for the scheme.
WFD Water Bodies	Construction, Operation and decommissioning	✔		There is the potential for direct and indirect impacts on WFD waterbodies (e.g. The Tees Transitional and Mercia Mudstone and Redcar Mudstone waterbodies) based on available information for the Proposed Scheme and the proximity of identified WFD waterbodies.

9.9. PROPOSED ASSESSMENT METHODOLOGY

9.9.1. The Water Environment assessment will involve the following tasks:

- Consultation with the EA, Stockton-on-Tees Borough Council in their role as Local Authority and Lead Local Flood Authority to establish the principal water environment issues associated with the Proposed Scheme;
- Consultation with NE regarding the nitrogen neutrality assessment and mitigation strategy;
- Consultation with Middlesborough County Council for additional baseline groundwater data within the Study Area;
- Detailed desk studies and field surveys to ascertain the baseline conditions on Site and in the Study Area;
- Assessment of the potential impacts related to the construction and operation phases of the Proposed Scheme; and
- Identification of measures to avoid, minimise or mitigate predicted impacts.

9.9.2. The assessment will focus upon defining the characteristics and subsequent potential impacts upon surface water, flood risk and groundwater receptors, including the wider hydrological catchments as categorised by the EA under the WFD. This catchment-based approach enables due consideration to be given to both individual locations where interactions occur and any cumulative impacts within larger water body areas.

SURFACE WATER AND GROUNDWATER RESOURCES

9.9.3. The assessment of potential impacts that may arise during construction and operation will be a qualitative assessment that considers risks to the quality of surface water receptors associated from pollutants that may arise during construction and operation. The potential impacts of the Proposed Scheme on groundwater receptors will also be a qualitative assessment undertaken with respect to identified groundwater abstractions and other groundwater dependent receptors.

9.9.4. The assessment will broadly follow the simple assessment criteria provided in DMRB Volume 11 Section 3 Part 10 (LA 113) No water quality sampling or qualitative analysis is proposed at this time.

9.9.5. Potential impacts associated with the disturbance of contaminated soils/sediment to controlled waters will be addressed in **Chapter 17: Geology and Soils**. The findings of this assessment will be cross-referenced in the Water Environment chapter.

SIGNIFICANCE OF EFFECT CRITERIA

9.9.6. The assessment of the significance of effect on the Water Environment will be undertaken following the principles of EIA as set out within the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 10 (LA113) (**Ref 9.26**). The DMRB promotes the following approach:

- Estimation of the importance of the feature (**Table 9-8**). The importance of the feature or resource is based on the value and sensitivity of the feature or resource;
- Estimation of the magnitude of the impact (**Table 9-9**). 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 importance of the attribute; and
- Assessment of the significance of the effect (**Table 9-10**). The overall significance of the effect is based on the importance of the attribute (**Table 9-8)** and the magnitude of the impact (**Table 9-9**).

Table 9-8 - Estimating the Importance of Water Environment Receptors

Importance	Criteria	Example	
Very High	Nationally significant attribute of high importance	Surface water	Watercourse having a WFD classification shown in a RBMP and Q95 ≥ 1. 0 m3/s. Site protected/designated under EC or UK legislation (SAC, SPA, SSSI, Ramsar site, salmonid water)/Species protected by EC legislation.
		Groundwater	Principal aquifer providing a regionally important resource and/or supporting a site protected under EC and UK Legislation. Groundwater locally supports GWDTE. SPZ 1
		Flood Risk	Essential infrastructure or highly vulnerable development.
High	Locally significant attribute of high importance	Surface water	Watercourse having a WFD classification shown in a RBMP and Q95 <1.0m3/s. Species protected under EC or UK legislation.
		Groundwater	Principal aquifer providing locally important resource or supporting a river ecosystem. Groundwater supports GWDTE. SPZ 2.
		Flood risk	More vulnerable development.

Importance	Criteria	Example	
Medium	Of moderate quality and rarity	Surface water	Watercourses not having a WFD classification shown in a RBMP and Q95 >0.001m3/s.
		Groundwater	Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ 3.
		Flood risk	Less vulnerable development.
Low	Lower quality	Surface water	Watercourses not having a WFD classification shown in a RBMP and Q95 ≤0.001m3/s.
		Groundwater	Unproductive strata.
		Flood risk	Water compatible development.

Table 9-9 - Criteria for Assessing the Potential Magnitude of an Impact

Magnitude	Criteria	Example	
Major Adverse	Results in loss of attribute and / or quality and integrity of the attribute	Surface water	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.
		Groundwater	Loss of, or extensive change to, an aquifer. Loss of regionally important water supply. Potential high risk of pollution to groundwater from routine runoff. Loss of, or extensive change to GWDTE or baseflow contribution to protected surface water bodies. Reduction in water body WFD classification. Loss or significant damage to major structures through subsidence or similar effects.
		Flood risk	Increase in peak flood level (> 100mm).

Magnitude	Criteria	Example	
Moderate Adverse	Affects integrity of attribute, or loss of part of attribute	Surface water	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.
		Groundwater	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.
		Flood risk	Increase in peak flood level (> 50mm).
Minor Adverse	Results in some measurable change in attribute's quality or vulnerability	Surface water	Minor effects on water supplies.
		Groundwater	Potential low risk of pollution to groundwater from routine runoff. Minor effects on an aquifer, GWDTEs, abstractions and structures.
		Flood risk	Increase in peak flood level (> 10mm).
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use of integrity	Surface water	No risk identified to water supplies.
		Groundwater	No measurable impact upon an aquifer and/or groundwater.
		Flood risk	Negligible change to peak flood level (≤ +/- 10mm).

Magnitude	Criteria	Example	
No Change	Results in no change to the receptor		No predicted adverse or beneficial impact to the receptor.

9.9.7. The terminology related to the significance of effects set up in DMRB Volume 11, Section 3, Part 10 (LA113) (**Ref 9.22**) has been followed and used to define the significance of the effects identified:

- Major effect: where the Proposed Scheme could be expected to have a very significant effect (either positive or negative) on receptors.
- Moderate effect: where the Proposed Scheme could be expected to have a noticeable effect (either positive or negative) on receptors.
- Minor effect: where the Proposed Scheme could be expected to result in a small, barely noticeable effect (either positive or negative) on receptors.
- Negligible: where no discernible effect is expected as a result of the Proposed Scheme on receptors.

Table 9-10 - Criteria for Assessing Significance of Effect

		Magnitude of Impact			
		Negligible	**Minor**	**Moderate**	**Major**
Importance of Receptor	**Very High**	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral or Slight	Neutral or Slight	Slight

WATER FRAMEWORK DIRECTIVE

9.9.10. Potential impacts of the construction and operation phases on the WFD status of the relevant water bodies will be assessed in a standalone WFD assessment. The findings of this assessment will be cross-referenced in the Water Environment chapter of the ES.

9.9.11. The WFD assessment will follow guidance set out in Planning Inspectorate Guidance Note 18: Water Framework Directive (2017) (**Ref 9.18**) and Clearing the Waters for All (2016) (**Ref 9.19**). These documents promote a staged approach to undertaking a WFD assessment comprising Screening, Scoping and Impact Assessment. This approach will be adopted for the assessment of the Proposed Scheme, with the findings of the Screening and Scoping stages discussed with the EA prior to undertaking the Impact Assessment stage.

9.9.12. The WFD assessment will comprise a qualitative assessment supported by site walkover. This walkover has not been completed at the time of writing this report. No survey or qualitative analysis is proposed at this time.

NITROGEN NEUTRALITY

9.9.13. A quantitative assessment of the additional nitrogen load discharged to the Teesmouth and Cleveland Coast SPA and Ramsar site will be submitted as part of the ES. The calculation will be prepared in accordance with NE's specified method as modified to suit the industrial nature of the Proposed Scheme.

9.9.14. A quantitative calculation of the required mitigation will be provided to demonstrate that the Proposed Scheme will achieve nitrogen neutrality.

FLOOD RISK

9.9.15. Potential impacts of the construction and operation phases on flood risk will be assessed in a standalone FRA, which will be submitted as part of the ES. The findings of this assessment will be cross-referenced in the ES.

9.9.16. The assessment will be undertaken in accordance with the NPPF (**Ref 9.14**) and its supporting PPG (**Ref 9.15**). The assessment will comprise a qualitative assessment informed by review of readily available data held by the EA, Local Authority (Stockton-on-Tees Borough Council) and Lead Local Flood Authority (Stockton-on-Tees Borough Council). It is not proposed to undertake quantitative analysis to assess temporary flood risk impacts during construction. The need to undertake quantitative analysis to assess potential impacts during operation will be discussed and agreed with the relevant authorities which are stated earlier in this paragraph.

9.9.17. The assessment of flood risk during operation will take the potential effects of climate change into account, namely recommended increases in peak river flow, sea level rise and rainfall intensity. Construction works are envisaged to be carried out over a period of up to 4 years. Considering the relatively short period of time for construction, it is not proposed to consider the effects of climate change for construction related impacts.

9.9.18. The FRA will be supported by a standalone drainage strategy report that sets out how surface water runoff will be managed during operation of the Proposed Scheme. The management of surface water flood risk during construction of the Proposed Scheme

is not proposed to be discussed in the FRA or drainage strategy report, and instead will form part of the CoCP.

9.10. LIMITATIONS AND ASSUMPTIONS

9.10.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- This EIA Scoping Report is based on currently available information and can be subject to change as the design progresses. This is of particular importance when considering potential impacts associated with the quality of surface water runoff, hydromorphology and channel hydraulics, and flood risk;
- Additional baseline information will be gathered to inform the PEIR and ES, including data requested from the EA and Stockton-on-Tees Borough Council in their role of Local Authority and Lead Local Flood Authority and Middlesborough County Council;
- Any gaps in information identified at this scoping stage will be considered and addressed along with specific mitigation measures as part of the assessments to produce the PEIR and ES;
- No additional GI is proposed at this stage for the Proposed Scheme. Existing ground conditions (including depth to groundwater) is based on historical GI data (2018 GI) and freely available data sources such as the BGS. These sources provide indicative records of ground conditions in the absence of site specific information/data;
- The scope of the WFD and FRA will be refined as the design progresses; and
- At this stage, the need for only a qualitative assessment assumed to be adequate (other than for the nitrogen neutrality assessment and mitigation strategy). The potential need for a quantitative assessment will be discussed with the EA and Stockton-on-Tees LLFA as the design progresses, and will be accounted for in the PEIR, ES and supporting FRA if required.

9.11. REFERENCES

Ref 9.1: 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/1147380/NPS_EN-1.pdf

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10. LANDSCAPE AND VISUAL

10.1. INTRODUCTION

10.1.1. This chapter considers the likely impacts of the Proposed Scheme on landscape character and visual amenity during construction, operation and decommissioning with preliminary consideration of potential significant effects. It sets out the proposed study area and methodology for the Landscape and Visual Impact Assessment (LVIA) and identifies those impacts that can be scoped out of the assessment. It provides the basis and focus for more detailed assessment as part of the EIA process.

10.2. POLICY, LEGISLATION AND GUIDANCE

10.2.1. The policy, legislation, and guidance relevant to the LVIA of the Proposed Scheme is as follows:

Table 10-1 – Landscape and Visual - Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
National Planning Policy Guidance (NPPF) 2021 **(Ref 10.1)**	At the heart of the Framework is a presumption in favour of sustainable development. Paragraph 130 states the following: ▪ *"Planning policies and decisions should ensure that developments:* *…c) are sympathetic to local character and history, including the surrounding built environment and landscape setting while not preventing or discouraging appropriate innovation or change…"*
Overarching National Policy Statement (NPS) for Energy (EN-1) 2011 **(Ref 10.2)**	The policy describes the approach to the use of landscape and visual assessment to inform the application. It states that: *"The landscape and visual assessment should include reference to any landscape character assessment and associated studies as a means of assessing landscape impacts relevant to the proposed project. The applicant's assessment should also take account of any relevant policies based on these assessments in local development documents in England…* *The applicant's assessment should include the effects during construction of the project and the effects of the completed development and its operation on landscape components and landscape character.* *The assessment should include the visibility and conspicuousness of the project during construction and of the presence and operation of the project and potential impacts on views and visual amenity. This should include light pollution effects, including on local amenity, and nature conservation."* (Section 5.9)

Policy / Legislation / Guidance	Description
Draft Overarching NPS for Energy (EN-1) 2023 **(Ref 10.3)**	The Government has published a draft update EN-1 in March 2023. For landscape, the draft is largely the same as in the 2011 NPS.
Stockton-on-Tees Local Plan 2019 **(Ref 10.4)**	Policy SD5 - Natural, Built and Historic Environment states - *"To ensure the conservation and enhancement of the environment alongside meeting the challenge of climate change the Council will:* 1. *Conserve and enhance the natural, built and historic environment through a variety of methods including:* *[…] j. Ensuring development proposals are responsive to the landscape, mitigating their visual impact where necessary. Developments will not be permitted where they would lead to unacceptable impacts on the character and distinctiveness of the Borough's landscape unless the benefits of the development clearly outweigh any harm. Wherever possible, developments should include measures to enhance, restore and create special features of the landscape..."*
Tees Valley Green Infrastructure Strategy 2008 **(Ref 10.5)**	Sets out a vision for a strategic network of Green Infrastructure for the Tees Valley
Biodiversity Net Gain **(Ref 10.6)**	A strategy to develop land and contribute to the recovery of nature, to ensure habitat for wildlife is in a better state than it was before development.
Legislation	
European Landscape Convention (ELC) 2000 **(Ref 10.7)**	European Union treaty signed by the UK to include planning, protection and management of landscape within policy.
Town and Country Planning Act 1990 (**Ref 10.8**)	Sets out the legislative planning framework for the Proposed Scheme.
Countryside and Rights of Way Act 2000 (**Ref 10.9**)	Sets out the legislative framework relating to access to the countryside including recreational routes.
Planning Act 2008 (**Ref 10.10**)	Sets out the legislative planning framework relating to development consent orders for nationally significant infrastructure projects.
Guidance	
Guideline for Landscape and Visual Impact Assessment, Third Edition (GLVIA 3) 2013 **(Ref 10.11)**	Sets out the guidelines for undertaking a landscape/townscape/seascape and visual impact assessment.
An approach to Landscape Character Assessment 2014 **(Ref 10.12)**	Provides guidance on the purpose, principles and approach to undertaking landscape character assessments.

Policy / Legislation / Guidance	Description
Visual Representation of Development Proposals: Landscape Institute Technical Guidance Note 06/19 **(Ref 10.13)**	Provides advice on how to capture and represent visual amenity through representative viewpoints and how the viewpoints should be presented.

10.3. STUDY AREA

10.3.1. The GLVIA 3 (**Ref 10.6**) clarifies how study areas should be determined on a project specific basis. Paragraph 5.2 of GLVIA 3 states that the study area extent should be *"… based on the extent of Landscape Character Areas likely to be significantly affected either directly or indirectly" or "on the extent of the area from which the development is potentially visible, defined as the Zone of Theoretical Visibility, or a combination of the two."*

10.3.2. For the purposes of this assessment, the initial Study Area for assessing potentially significant landscape and visual effects has been defined as a 2km radius from the Site (being the area of the Proposed Scheme) as shown on **Figure 10-1: Proposed LVIA Study Area**. This is based on professional judgement which includes and an initial analysis of anticipated scale and likely geographical influence of the Proposed Scheme, as defined in **Chapter 2: Site and Proposed Scheme Description** and a preliminary ZTV shown in **Figure 10-2**.

10.3.3. This initial Study Area could be refined further in agreement with Stockton-on-Tees Borough Council (STBC) and other relevant consultees following design development stages when heights, extent and location of structures are confirmed. The final agreed Study Area and a record of the consultation feedback will be reported in the Environmental Statement (ES).

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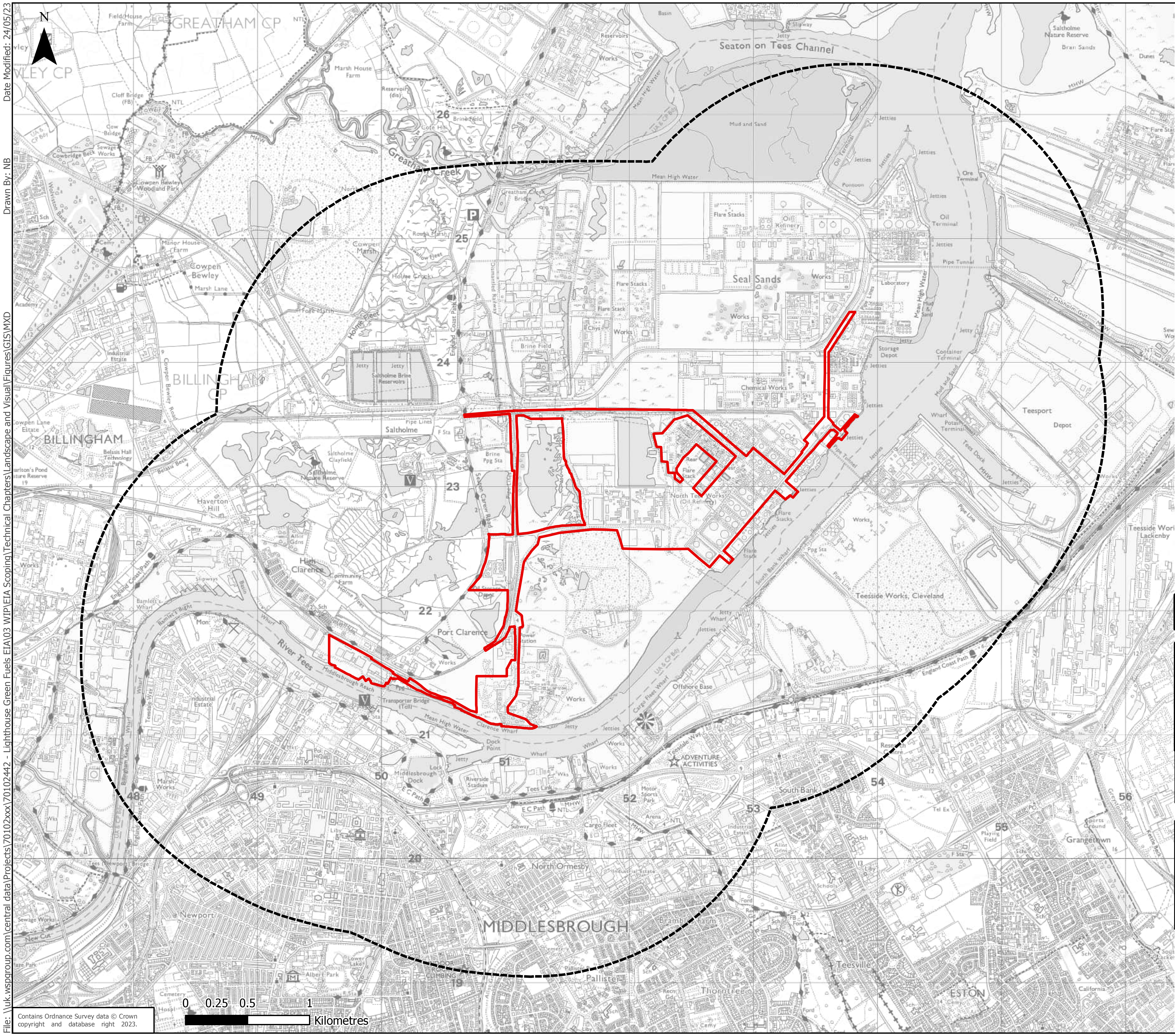

Legend

- Proposed DCO Application Boundary
- 2km Study Area

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

APPLICANT: Lighthouse Green Fuels Ltd

TITLE: Lighthouse Green Fuels

FIGURE: Figure 10.1
Proposed LVIA Study Area

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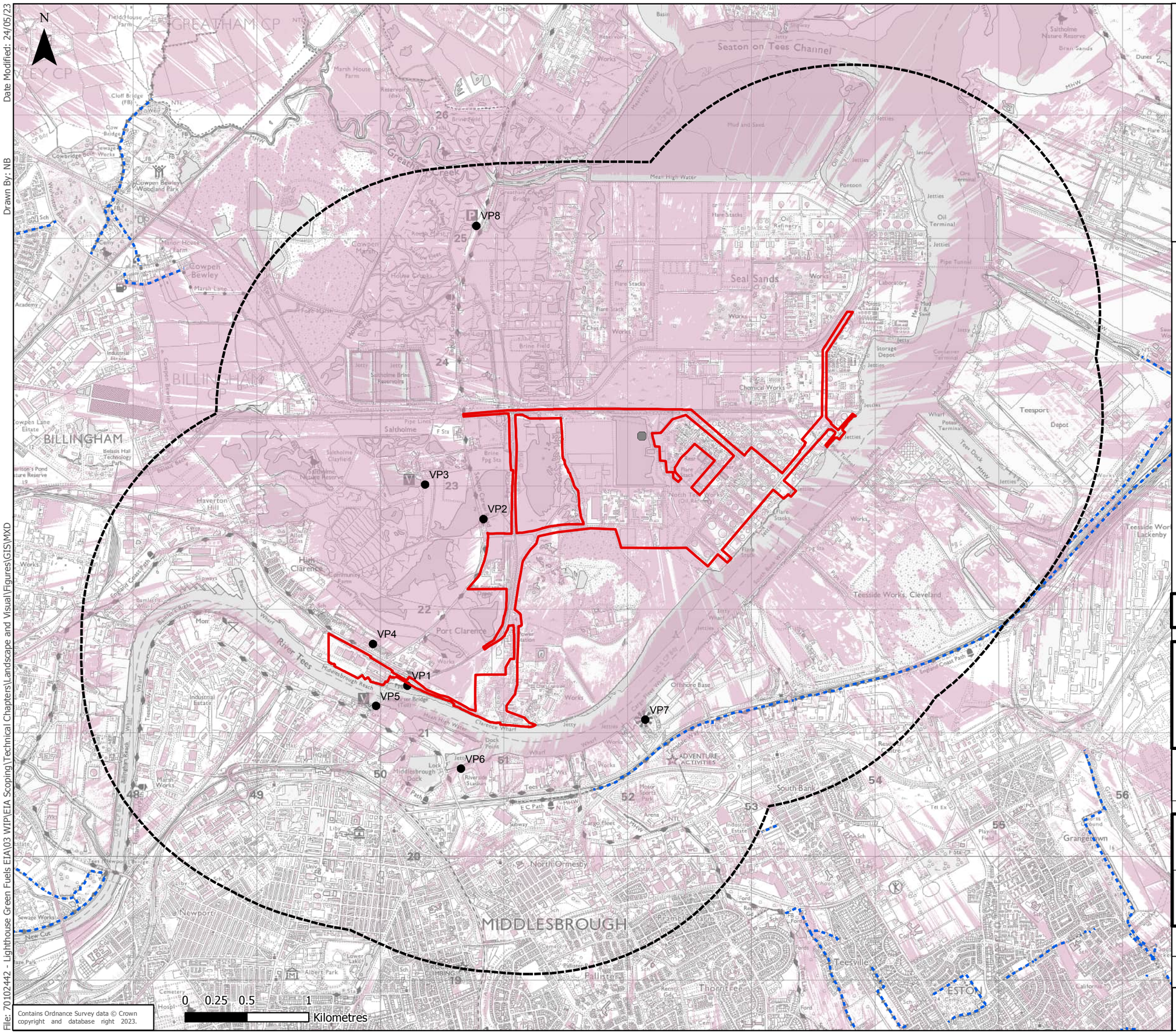

Legend

- Proposed DCO Application Boundary
- 2km Study Area
- PROW
- Zone of Theoretical Visibility
- Proposed Flare Stack
- Proposed Representative Viewpoint Locations

Note:
1. ZTV is based on a worst case scenario development height of 130mAOD using 2m Lidar DSM.
The ZTV is based on a viewer height of 1.6m
2. Hartlepool Borough Council and Middlesbrough Council PROW to be confirmed
3. It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

APPLICANT: Lighthouse Green Fuels Ltd

TITLE: Lighthouse Green Fuels

FIGURE: Figure 10.2
Preliminary ZTV & Proposed Viewpoint Location Plan

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10.4. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

10.4.1. To establish the baseline, a combination of desktop study and an initial walkover of the area surrounding the Site has been undertaken. This process has been further informed by a preliminary Zone of Theoretical Visibility (ZTV) as shown in **Figure 10-2**.

10.4.2. Baseline information has been collated via the following documents and data which will form part of the baseline desk study:

- Magic.gov.uk[1];
- Ordnance survey data;
- Google Earth;
- Stockton-on-Tees Local Plan 2019 (**Ref 10.4**);
- Stockton on Tees Landscape Character Assessment 2011 (**Ref 10.14**);
- Middlesborough Council Landscape and Heritage Assessment 2016 (**Ref 10.15**);
- Redcar & Cleveland Borough Council Landscape Character SPD 2010 (**Ref 10.16**);
- Hartlepool Landscape Assessment 2000 (**Ref 10.17**); and
- National Landscape Character Area (NCA) 23 Tees Lowlands (**Ref 10.18**).

10.4.3. The baseline for landscape character and visual amenity are set out below.

LANDSCAPE CHARACTER

The Site

10.4.4. The Site largely comprises existing and disused industrial development north of the River Tees. Existing infrastructure and services within the Site include; large industrial structures, a rail link and two wharfs. Several straight roads provide access through the site, broadly running east to west, and a rail link follows part of the western boundary of the Site.

10.4.5. The landform is broadly flat with limited vegetation, combining to create expansive views dominated by vertical elements including electricity pylons, poles and stacks, both within the Site and in the wider area.

[1] https://magic.defra.gov.uk/magicmap.aspx

10.4.6. Pockets of vegetation include areas of rough grassland, a small number of scattered trees and ponds of varying size extending from the RSPB Saltholme Reserve to the west of the Site.

Landscape context

10.4.7. Overall, the landscape context of the Proposed Scheme is strongly influenced by the presence of urban development and heavy industry, much on reclaimed land, along the banks of the River Tees north of Middlesborough and east of Billingham. Major industrial installations, including an oil refinery, oil storage and a chemical works, form a dramatic skyline with many vertical elements, juxtaposed with expansive wetlands, mudflats, sand dunes and salt marshes. The surrounding landform has been shaped by landfill, resulting in a number of artificial mounds in the otherwise flat estuary landscape.

10.4.8. Designations indicative of ecological value within the study area include: the Teesmouth and Cleveland Coast Special Protection Area (SPA) Ramsar Site, Teesmouth National Nature Reserve, Teesmouth and Cleveland Coast SSSIs, Local Nature Reserves and Local Wildlife Sites, as shown on **Figure 10-4**. Arable farmland to the north-west is open and flat. It tends to be enclosed by fences, marked with occasional small hedgerow trees, which contrast with high security fencing typically used in the industrial area to the south. Minimal trees and hedgerows mean the landscape is visually expansive, and vertical urban features such as stacks and electricity pylons appear prominent. Historic features within the Study Area include scattered listed buildings, most notably the Grade II* listed Transporter Bridge and Grade 2 listed Haverton Hill and Port Clarence War Memorial, and Middlesbrough Historic Quarter Conservation Area (**Chapter 11: Cultural Heritage** sets these out in more detail). To the south of the River Tees, the northern edge of Middlesborough comprises urban elements including industrial buildings, a football stadium, edge of town retail parks, power lines, roads and railways. The principal rail and road network broadly follows the meandering River Tees south of the river, with a strong grid pattern in residential areas in Middlesborough. To the north, the transport network is sparser.

10.4.9. There are no National Parks or Areas of Outstanding Natural Beauty (AONBs) within the Site or Study Area. The nearest protected landscape is the North York Moors National Park approximately 9.1km south-east of the Site. Albert Park, a Grade II Registered Park and Garden is located on the southern boundary of the Study Area, within a densely built-up residential area. There are several conservation areas within the Study Area, including Middlesborough Historic Quarter south of the Transporter Bridge, Cowpen Bewley north-west of the Proposed Scheme, and Albert Park and Linthorpe Road, again on the southern boundary of the Study Area.

National Landscape Character

NCA 23 Tees Lowlands

10.4.10. Natural England's National Character Areas represent areas of distinct and recognisable character at the national scale for use as a framework for decision-making and planning for future change (**Ref 10.19**). As shown on **Figure 10-3** the Site and Study Area is entirely within Natural England's National Landscape Character Area 23 (NCA 23) Tees Lowlands NCA (**Ref 10.18**).

10.4.11. The LVIA will consider the relevant key characteristics of the landscape character of the Study Area as identified under Natural England's character profile for Tees Lowlands. The Key Characteristics are the following, with the most relevant in **bold**:

- ***"A broad, low-lying and open plain of predominantly arable agricultural land, with low woodland cover and large fields, defined by wide views to distant hills;***
- ***A large area of urban and industrial development around the Tees Estuary, must of which is on reclaimed land, contrasts with the quieter rural areas to the south and west;***
- ***Major industrial installations around Teesmouth form a dramatic skyline, but are juxtaposed with expansive mudflats, sand dunes and salt marshes which are nationally and internationally designated for their assemblage of waterfowl;***
- ***Slow-moving rivers Tees and Leven meander through the landscape with steep, well-wooded banks;***
- *A distinctive area of low-lying farmland with remnants of former wetland habitat in the flood plain of the River Skerne to the north-west;*
- *Permo-Triassic red mudstones and sandstones are masked by glacial drift and alluvial material but can be seen outcropping at the coast in places;*
- ***Principal transport corridors, power lines and energy infrastructure are conspicuous elements in the landscape. Industrial development fringing the tidal reaches of the River Tees contrasts with the surrounding rural landscape;***
- ***Brownfield sites where semi-natural vegetation has started to regenerate on previously developed land; and***
- Green corridors such as minor valleys and former railway lines provide links between urban areas and the surrounding countryside."

10.4.12. The LVIA will also consider the Statements of Environmental Opportunity (SEO) identified for the NCA 23 Tees Lowlands which are the following, with the most relevant in **bold**:

- ***"SEO 1: Protect and enhance the unique landscape of the Tees Estuary with its mosaic of internationally important intertidal, wetland and brownfield habitats;***
- *SEO 2: Incorporate semi-natural habitats within the farmed environment, and use innovative farming techniques in order to improve the value of food provision alongside biodiversity, flood water storage capacity, and the ability of the landscape to adapt to the impacts of climate change; and*
- ***SEO 3: Ensure that there is a well-connected network of high-quality green infrastructure throughout the Tees Lowlands which will enable people to understand and enjoy the natural environment, as well as providing a range of other benefits including biodiversity enhancement, food provision and flood risk mitigation."***

Regional and Local level landscape character studies

10.4.13. At a local level, the Study Area falls within the following Landscape Character Assessments which will be used to inform the LVIA:

- Stockton on Tees Landscape Character Assessment 2011 (**Ref 10.14**)
    - East Billingham to Teesmouth Landscape Character Area; and
    - Thorpe & Billingham Beck Valley Landscape Character Area.
- Middlesborough Council Landscape and Heritage Assessment 2016 (**Ref 10.15**)
- Redcar & Cleveland Borough Council Landscape Character SPD 2010 (**Ref 10.16**)
    - Redcar Flats Broad Landscape Area.
- Hartlepool Landscape Assessment 2000 (**Ref 10.17**)
    - Coastal Fringe Landscape Character Area; and
    - Estuarine Landscape Character Area.

10.4.14. Relevant Landscape Character Areas within the Stockton on Tees Landscape Character Assessment 2011 are set out below. In relation to other Landscape Character Assessments, only a very limited proportion of the character areas identified fall within the Study Area with very limited potential for significant effects to occur and therefore the characteristics for these areas have not been set out.

10.4.15. Middlesborough Council Landscape and Heritage Assessment 2016 is limited in its scope to defined 'Evaluation Parcels' rather than a district-wide assessment. Only a limited area of two parcels, Parcel 1 Albert Park and Parcel 13 Tees Link, fall within the southern portion of the Study Area with very limited potential for significant effects to occur. For this reason Middlesborough Council Landscape and Heritage Assessment 2016 is not considered any further.

Stockton on Tees Landscape Character Assessment 2011

10.4.16. The LVIA will consider the key characteristics of the host Landscape Character Area, East Billingham to Teesmouth, which are the following, with the most relevant in **bold**:

- ***"Industrial landscape fringing Billingham integrated with large areas of open space including wetlands and reclaimed semi improved pasture;***
- ***Farmland is open and flat with minimal landscape features;***
- ***Industry dominated area to the east along the River Tees;***
- ***Open space within industrial areas contain significant wildlife value with a number of ecological designations present including Sites of Special Scientific Interest (SSSIs), Site of Nature Conservation Importance (SNCI), Special Protection Area (SPA), Ramsar Site and Teesmouth National Nature Reserve;***
- *Important 'ridge and furrow' within the field pattern around the settlement of Cowpen Bewley;*
- *The Stockton to Hartlepool railway line is notable feature within the landscape, dividing the Landscape Character Area between estuarine and non-estuarine/rural fringe influences; and*
- ***Cowpen Bewley Woodland Park provides the only wooded element within this Landscape Character Area."***

VISUAL AMENITY

10.4.17. To understand potential visibility of the Proposed Scheme a preliminary ZTV has been prepared using the Environment Agency's Lidar DSM based on the maximum height of the Proposed Scheme, being 130m, as shown in **Figure 10-2**.

10.4.18. Visual receptors include the people who live, work, visit and travel through areas in proximity to the Proposed Scheme. Those visual receptors likely to experience visual effects are set out below and illustrated in **Figure 10-2**.

Residential receptors

10.4.19. Residents in Port Clarence to the south-west of the Site may experience more direct views of the Proposed Scheme Cowpen Bewley to the north-west of the Site is well screened and sufficiently distant from the Site that residents are unlikely to experience significant visual effects. South of the River Tees, residential areas to the south of the Site are generally well screened by intervening extensive areas of large industrial buildings, structures and associated infrastructure situated on the southern bank of the River Tees. To the north and east of the Site, there are no residential receptors within the industrial landscape within the Study Area.

Recreational facilities and visitor attractions

10.4.20. Public Rights of Way (PROW) are generally quite limited within the Study Area, however the routes of both the England Coast Path and Teesdale Way pass close to the Proposed Scheme, and nearby visitor attractions include RSPB Salthome Reserve, the River Tees Viewpoint, Teesmouth National Nature Reserve, Middlesborough Transporter Bridge, and Riverside Stadium.

10.4.21. The Saltholme RSPB Reserve visitor centre is located approximately 0.8km to the west of the Site and vehicular access to the centre is through Seaton Carew Road. The Saltholme RSPB Reserve comprises the visitor centre with a café and interpretative facilities and pedestrian access to the reserve by a network of boardwalks and footpaths.

10.4.22. Teesmouth National Nature Reserve which includes a network of trails providing access to the Teesmouth National Nature Reserve and hides overlooking wetland systems is located approximately 1.5km to the north of the Site.

Transport receptors

10.4.23. Whilst considered to be of lower sensitivity, people using the transport network within the Study Area may experience views of the Proposed Scheme, including from the A178 Seaton Carew Road located to the west of the Site and from the B1513 located to the south of Site on the south bank of the River Tees.

Viewpoints

10.4.24. Based on a review of the ZTV, followed by an initial site visit, a series of proposed viewpoints within the study area have been identified which will be used to inform the visual assessment. These viewpoints are listed in **Table 10-2** below and shown on **Figure 10-2** and area further detailed in **Section 10.5**.

Table 10-2 - Preliminary Viewpoint Locations

Ref	Viewpoint Name	Receptor Type	Approximate distance to the Site	Grid Ref
1	Tees Transporter Trail	Recreational	20m	NZ 50216, 21380
2	Seaton Carew Road	Recreational / transport users	100m	NZ 50831, 22729
3	RSPB Salthome Reserve	Recreational	625m	NZ 50357, 23009
4	Port Clarence Greenspace	Residential	90m	NZ 49937, 21718
5	Transporter Bridge	Recreational	140m	NZ 49960, 21216
6	Riverside Stadium	Recreational	450m	NZ 50649, 20709
7	Tees Viewpoint	Recreational	870m	NZ 52141, 21105
8	Teesmouth National Nature Reserve	Recreational	1470m	NZ 50775, 25102

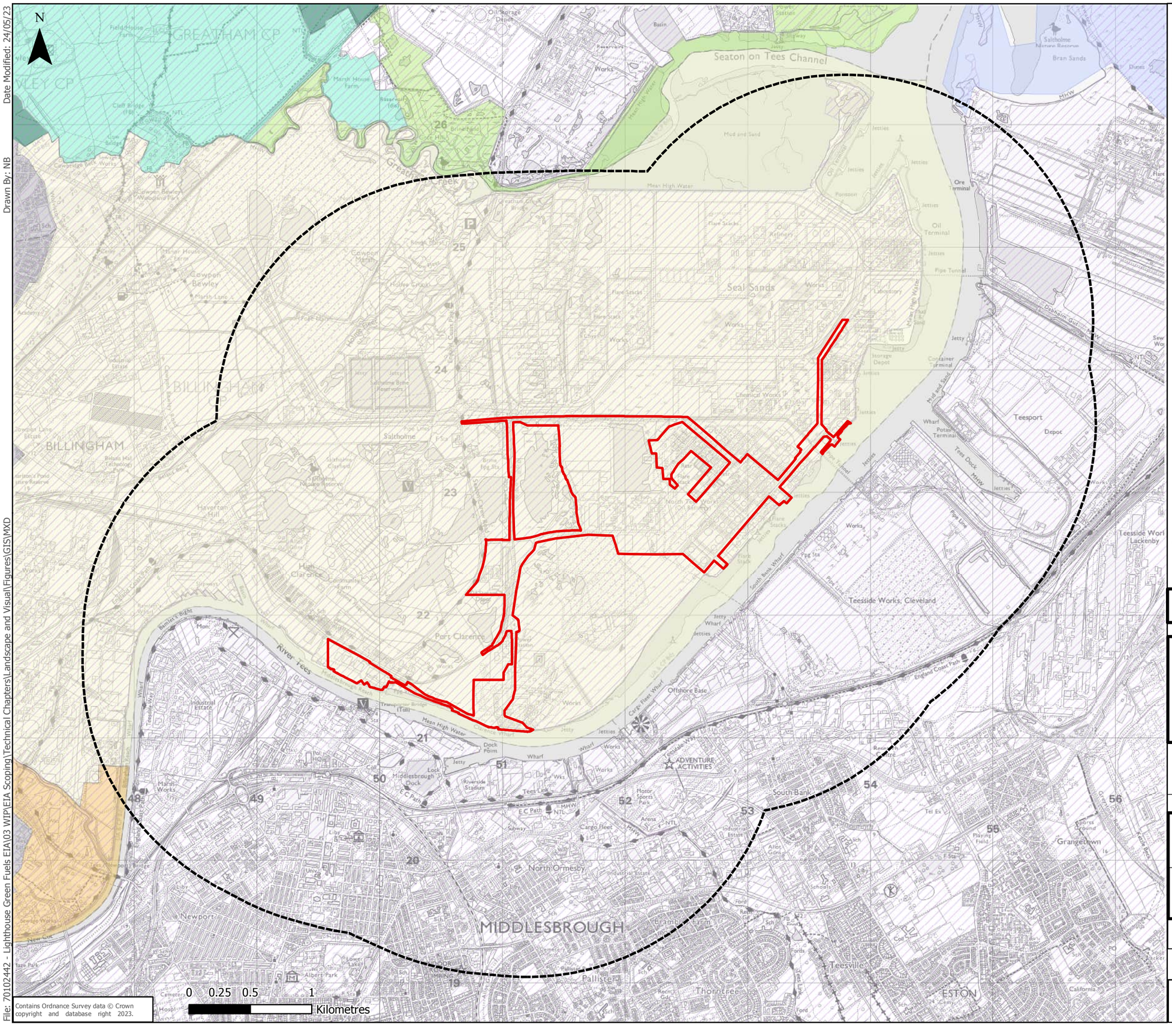
FUTURE BASELINE

10.4.25. In the absence of the Proposed Scheme, it is likely the majority of the landscape and visual baseline within the Study Area would remain comparable over the assessment years to that of the current baseline for the reasons below.

10.4.26. Current land use and management are predominantly related to large scale industry and future developments within the Study Area are anticipated. It is anticipated that new development will particularly relate to the evolution and repurposing of existing industrial facilities as new technologies are developed and utilised requiring the reconfiguration of buildings, structures and site layouts. The TV1 and TV2 sites also have existing consent for energy uses, although not currently in operation, so it is assumed that it could be developed for similar use.

10.4.27. Where management of landscape lapses over time, natural succession of habitats from grassland to scrub and woodland may occur. Although species abundance and distribution within the Study Area may fluctuate, it is assumed there would be no substantial changes to species or vegetation cover within the Study Area that would change the landscape and visual baseline aside from natural succession of habitats and natural increases and decreases in species populations and geographic extent.

10.4.28. Increased air temperature and increased incidence of heatwaves as well as flooding events associated with climate change could result in fluctuations of species abundance and distribution which could alter the future baseline.



Legend

- Proposed DCO Application Site Boundary
- 2km Study Area
- National Landscape Character Area (NCA) 23 Tees Lowlands

Stockton on Tees Landscape Character Assessment 2011

- East Billingham to Teesmouth Landscape Character Area
- Thorpe & Billingham Beck Valley Landscape Character Area
- Urban

Redcar & Cleveland Borough Council Landscape Character SPD 2010

- Redcar Flats Broad Landscape Area

Hartlepool Landscape Assessment 2000

- Rural Fringe LandscapeCharacter Area
- Estuarine Landscape Character Area
- Undulating Farmland Landscape Area

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

APPLICANT: Lighthouse Green Fuels Ltd

TITLE: Lighthouse Green Fuels

FIGURE: Figure 10.3
Landscape Character Plan

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File: 70102442 - Lighthouse Green Fuels EIA\03 WIP\EIA Scoping\Technical Chapters\Landscape and Visual\Figures\GIS\MXD

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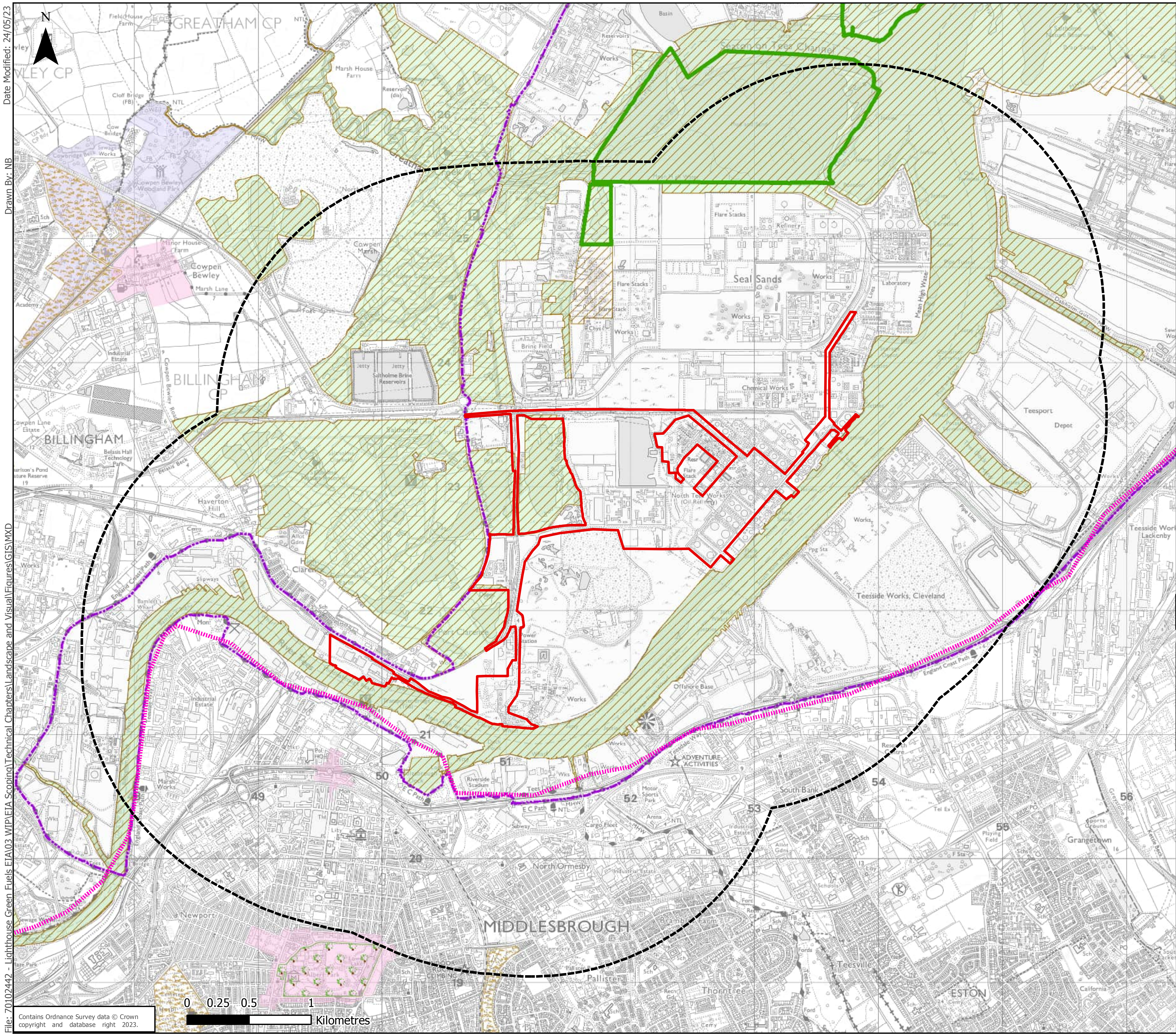

Legend

- Proposed DCO Application Boundary
- 2km Study Area
- England Coast Path Route
- Teesdaleway
- Special Protection Areas
- Sites of Special Scientific Interest (SSSI)
- National Nature Reserve
- Local Nature Reserves
- Parks and Gardens
- Conservation Areas
- Country Parks

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

APPLICANT: Lighthouse Green Fuels Ltd

TITLE: Lighthouse Green Fuels

FIGURE: Figure 10.4 Landscape Designation Plan

SCALE @ A3:	CHECKED:		APPROVED:
1:30,000	LB		DS
PROJECT No:	**DESIGNED:**	**DRAWN:**	**DATE:**
70102442	LB	NB	06.07.2023

DRAWING No: 70102442-WSP-RP-ES-1004 **REV:** 02

10.5. SENSITIVE RECEPTORS

10.5.1. Following preliminary desktop and site analysis, the following sensitive landscape and visual receptors have been identified:

LANDSCAPE

- The River Tees immediately adjacent to the south of the Site;
- Water bodies and wetland systems within the Study Area including:
    - Dorman's Pool Nature Reserve immediately adjacent to the Site.
- Distinctive landscapes characterised by relatively flat, low lying land and the frequent presence of water bodies, wetland systems and drainage channels. These areas include land within:
    - Saltholme East Pool Nature Reserve approximately 0.1km to the west of the Site;
    - RSPB Saltholme Reserve situated approximately 0.6km to the west of the Site;
    - Paddy's Pool Nature Reserve approximately 0.85km to the west of the Site; and
    - Teesmouth National Nature Reserve situated approximately 1.5km to the north of the Site.

VISUAL

- Recreational receptors on the Tees Transporter Trail approximately 20m south of the Site;
- Recreational receptors using the England Coast Path and transport users on Seaton Carew Road, approximately 100m north-west of the Site;
- Recreational receptors at RSPB Salthome Reserve, approximately 625m west of the Site;
- Residential receptors at Port Clarence Greenspace, approximately 90m north of the Site;
- Recreational receptors at the Transporter Bridge, approximately 140m south of the Site;
- Recreational receptors at Riverside Stadium, approximately 450m south of the Site;
- Recreational receptors at the Tees Viewpoint, approximately 870m east of the Site; and
- Recreational receptors at Teesmouth National Nature Reserve, approximately 1.5km north-west of the Site.

10.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

10.6.1. As an inherent part of the design process, landscape and visual effects will be considered in relation to the Proposed Scheme which includes a number of embedded mitigation measures.

10.6.2. Key areas for mitigation include those associated with the orientation of principal components of the Proposed Scheme to provide a satisfactory visual composition as perceived from the wider landscape context. This aspect is subject to ongoing design development, together with the selection of appropriate surface materials and finishes aimed at providing a relatively unified and harmonious appearance. Tree and shrub planting will also be provided to aid visual assimilation and screen lower level ancillary elements of the Proposed Scheme. The avoidance of loss and/or replacement of any lost vegetation within the Site and the introduction of additional green/blue infrastructure will be part of the iterative design process, with the intention of achieving 10% Biodiversity Net Gain (BNG) in line with Government policy. The LVIA will include a landscape strategy drawing illustrating an overview of the embedded mitigation measures considered in the assessment and additional measures identified to mitigate significant residual effects.

10.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

10.7.1. Elements of the Proposes Scheme that are likely to give rise to landscape and visual effects during the construction phase include:

- Enabling works including Site vegetation clearance, ground works including demolition of any remaining existing above ground structures, remediation works (if required) and excavation of any voids or underground services;
- Excavation and backfilling of the former and existing evaporation pond (currently empty) located on the Site;
- Construction activity including vehicular movements, compounds, storing of waste materials;
- The presence of tower cranes (of up to a maximum height of 145m max) on the skyline during construction of taller elements, and the presence of aviation lighting;
- Temporary construction compounds; and
- A temporary construction worker site located off-Site.

10.7.2. The introduction of these elements are likely to give rise to the following significant landscape and visual effects:

- Changes to landscape character within the Site and its immediate surroundings;

- Visual changes experienced by recreational receptors at RSPB Salthome Reserve, Teesmouth National Nature Reserve, the River Tees Viewpoint, Middlesborough Transporter Bridge, Riverside Stadium, and users of the England Coast Path and Teesdale Way;
- Visual changes experienced by residential receptors in the settlement of Port Clarence; and

OPERATION PHASE

10.7.3. Elements of the Proposed Scheme likely to give rise to landscape and visual effects during the operation phase include:

- 24 hour operational activity introducing noise, movement and lighting within the Site;
- Tall structures, including flare stacks up to a maximum height of 130m with associated plumes;
- Large scale industrial buildings and silos associated with the SAF Plant;
- Associated development including administration buildings, kiosks and housing, boundary treatments, security infrastructure, temporary and permanent laydown areas, hard and soft landscaping, drainage, cables, pipelines, plant and equipment; and
- Off-Site parking facilities.

10.7.4. The introduction of these elements are likely to give rise to the following significant landscape and visual effects:

- Changes to landscape character within the Site and its immediate surroundings;
- Visual changes experienced by residential receptors in the settlements of Port Clarence;
- Visual changes experienced by visual receptors to the following visitor destinations: RSPB Salthome Reserve, Teesmouth National Nature Reserve, the River Tees Viewpoint, Middlesborough Transporter Bridge and Riverside Stadium; and
- Visual changes associated with additional industrial infrastructure experienced by recreational receptors using the England Coast Path and the Teesdale Way..

DECOMMISSIONING PHASE

10.7.5. Elements of the Proposed Scheme likely to give rise to landscape and visual effects during the decommissioning phase include:

- Demolition of most/all structures; and
- Removal of materials off-Site by road, rail or marine infrastructure.

10.7.6. The introduction of these elements are likely to give rise to the following significant landscape and visual effects:

- Changes to landscape character within the Site and its immediate surroundings;
- Visual changes experienced by residential receptors in the settlements of Port Clarence;
- Visual changes experienced by visual receptors to the following visitor destinations: RSPB Salthome Reserve, Teesmouth National Nature Reserve, the River Tees Viewpoint, Middlesborough Transporter Bridge and Riverside Stadium; and
- Visual changes associated with additional industrial infrastructure experienced by recreational receptors using the England Coast Path and the Teesdale Way.

ELEMENTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

10.7.7. The elements scoped in or out of the LVIA are presented in **Table 10-3**.

Table 10-3 - Elements Scoped in or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Changes to landscape character within the Site and its immediate surroundings due to construction activities, and associated plant and lighting	Construction	✔		Potential for noise, movement and for disturbance to vegetation within the Site which may have a significant effect on the landscape character within the Site and its immediate surroundings
Changes to East Billingsham to Teesmouth Landscape Character Area within the Study Area due to construction activities, and associated plant and lighting	Construction	✔		Given the intensive urban and industrial context of the Proposed Scheme, it is unlikely that construction will lead to widespread significant changes to landscape character within the Study Area, as identified on **Figure 10-3**. However, some localised significant effects may be experienced within adjoining and nearby distinctive landscapes characterised by extensive wetland systems.
Changes to East Billingsham to Teesmouth Landscape Character Area	Operation	✔		The intensive urban and industrial context of the Proposed Scheme will limit the potential for significant changes to landscape character within the Study Area, as identified on **Figure 10-3**. However,

Element	Phase	Scoped In	Scoped Out	Justification
within the Study Area due to new built form, and infrastructure including lighting and landscaping				some localised significant effects may be experienced within adjoining and nearby distinctive landscapes characterised by extensive wetland systems.
Changes to other Landscape Character Areas within the Study Area due to construction activities, and associated plant and lighting	Construction		✔	Outside the East Billingham to Teesmouth Landscape Character Area, only very limited extents of the character areas identified on **Figure 10-3** fall within the Study Area, and where this happens it is on the periphery. Due to distance, intervening built form and vegetation, they are unlikely to be significantly affected by construction activities associated with development of the Proposed Scheme.
Changes to other Landscape Character Areas within the Study Area due to new built form, and infrastructure including lighting and landscaping	Operation		✔	Outside the East Billingham to Teesmouth Landscape Character Area, only very limited extents of the character areas identified on **Figure 10-3: Landscape** Character Plan fall within the Study Area, and where this happens it is on the periphery. Due to distance, intervening built form and vegetation, they are unlikely to be significantly affected by development of the Proposed Scheme.
Changes to existing visual amenity of surrounding sensitive recreational and residential receptors due to construction activities, and associated plant and lighting.	Construction	✔		Whilst the Proposed Scheme is located within an urban industrial context, there are several locations nearby where residential and recreational visual receptors may experience significant changes to visual amenity due to construction activities, as identified on **Figure 10-2**.
Changes in existing visual amenity of surrounding sensitive recreational and residential receptors due to new built form, and	Operation	✔		Whilst the Proposed Scheme is located within an urban industrial context, once operational there are several locations nearby where residential and recreational visual receptors may experience significant changes to visual amenity, as identified on **Figure 10-2**.

Element	Phase	Scoped In	Scoped Out	Justification
infrastructure including lighting and landscaping				
Receptors beyond 2km	Construction and operation		✔	Upon an initial desktop review and following the Site visit to identify sensitive visual receptors, the 2km Study Area is deemed proportionate to the type of Proposed Scheme. Due to the existing, extensive industrial context of the Site location it is unlikely that the Proposed Scheme will have a strong characterising or visual influence beyond a relatively localised area. Accordingly, landscape and visual receptors beyond 2km would be unlikely to experience significant effects and. are therefore scoped out.

10.8. PROPOSED ASSESSMENT METHODOLOGY

10.8.1. The LVIA would follow the guidance set out in GLVIA3 (**Ref 10.11**) published by the Landscape Institute (LI) and the Institute of Environmental Management and Assessment (IEMA), 3rd Edition (2013). Additionally, guidance in 'An Approach to Landscape Character Assessment', Natural England (2014) (**Ref 10.12**) would be followed.

10.8.2. Section 5.9 of Overarching National Policy Statement for Energy EN-1 (**Ref 10.2**) sets out generic considerations to be given to landscape and visual impacts which are in line with those set out in GLVIA3. Reference would also be made to relevant local planning policy documents, regional and local guidance including landscape character assessments, and aerial photographs and Ordnance Survey data.

10.8.3. The extent of the Study Area and number of viewpoints proposed is proportionate to the type and scale of development, the nature of the Site context and is focussed on the identification of significant effects. A ZTV informed by the Proposed Scheme parameters including the tallest elements of the Proposed Scheme will be produced by computer modelling, based on a digital terrain model (DTM) and/or a digital surface model (DSM).

10.8.4. Following review of the desk top study, preliminary ZTV, and site walkover, the proposed viewpoints and receptors represented are listed in **Table 10-2** above and illustrated on **Figure 10-2**.

10.8.5. The requirement for photomontages from agreed viewpoints will be determined in consultation with Stockton on Tees Borough Council, Middlesborough Council and any other relevant organisations. All photographs and visualisations will be produced

in accordance with the Landscape Institute Technical Guidance Note (TGN) 06/19 (2019); 'Visual Representation of Development Proposals' (**Ref 10.13**). Annotated photo-panoramas (to TGN 06/19 Type 1) of the Proposed Scheme would be produced for all viewpoints, and photomontages (to TGN 06/19 Type 3) for a selection of up to three viewpoints.

10.8.6. Cumulative effects with any other Proposed Scheme of a similar type within the Study Area will be considered in the assessment. **Chapter 21: Cumulative Effects** sets out the approach to identifying cumulative sites.

SIGNIFICANCE OF EFFECT CRITERIA

10.8.7. The key terms used within the LVIA following guidance of the GVLA3 (**Ref 10.11**) are:

- Susceptibility and Value – which are combined to determine sensitivity;
- Scale, Duration and Extent - which are used to determine the Magnitude of effect; and
- Significance.

10.8.8. The evaluation of landscape and visual effects involves consideration of the sensitivity to change, derived during the baseline assessment, and the predicted magnitude of the impact (change) that would occur in light of the construction and subsequent operation of the Proposed Scheme. Where viewpoints are representative of more than one type of receptor, the assessment reports the effects based on the most sensitive type of receptor.

10.8.9. The predicted effects take into consideration the embedded measures incorporated as part of the Landscape Strategy of the Proposed Scheme and the temporary or permanent nature of that change. As is the case with the magnitude of impact (change), effects can be either adverse or beneficial.

10.8.10. An indication of the interactions between sensitivity and magnitude of impact (change) and the likely resulting significance of effects are outlined in **Table 10-4** below, in accordance with GLVIA3.

Table 10-4 - Significance matrix

Significance matrix					
		Magnitude			
		High	**Medium**	**Low**	**Negligible**
Sensitivity	**High**	Major	Major or Moderate	Moderate	Minor or Negligible
	Medium	Major or Moderate	Moderate	Moderate or Minor	Negligible
	Low	Moderate	Moderate or Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

10.8.11. Using professional judgement and with reference to GLVIA3, the assessments within this LVIA considers the effects of moderate and above to be significant (as shown in bold in **Table 10-4)** while those less than moderate to be non-significant.

10.8.12. Any receptors assigned an overall negligible level effect at year 1 will not be further considered or assessed in year 15 on the basis that effects are highly unlikely to increase to a level of significance at year 15 given year 1 is considered to present the worst-case scenario at operation.

10.8.13. Susceptibility is assessed for both landscape receptors such as landscape elements and character areas and for visual receptors (people). It indicates the ability of a defined landscape or visual receptor to accommodate the Proposed Scheme *"without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies."* (GLVIA, 3rd version, para 5.40).

10.8.14. A description of how susceptibility is evaluated for each receptor type is included below:

- High – undue consequences are likely to arise from the Proposed Scheme;
- Medium – undue consequences may arise from the Proposed Scheme; and
- Low - undue consequences are unlikely to arise from the Proposed Scheme.

10.8.15. Landscape Value is "*the relative value that is attached to different landscapes by society*" (GLVIA, 3rd version, page 157). It is rated on the following scale:

- National/International – Designated landscapes which are nationally or internationally designated for their landscape value, including National Parks, Areas of Outstanding Natural Beauty, World Heritage sites, Heritage Coast and National Scenic Areas;

- Local – Locally or regionally designated landscapes (e.g. Area of High Landscape Value, Regional Scenic Areas); also, areas which local evidence indicates as being more valued than the surrounding area;
- Community – 'everyday' landscape which is appreciated by the local community but has little or no wider recognition of its value; and
- Limited – despoiled or degraded landscape with little or no evidence of being valued by the community.

10.8.16. Scale of effect is assessed for all landscape and visual receptors and identifies the degree of change which would arise from the development. It is rated on the following scale:

- Major – Total or major alteration to key elements, features, qualities or characteristics, such that post development, the baseline situation will be fundamentally changed;
- Moderate – Partial alteration to key elements, features, qualities or characteristics, such that post development the baseline situation will be noticeably changed;
- Minor – Small alteration to key elements, features, qualities or characteristics, such that post development the baseline situation will be largely unchanged despite discernible differences; and
- Imperceptible – A change that is barely noticeable or cannot be perceived.

10.8.17. Duration of effect is assessed for all landscape and visual receptors and identifies the period over which the change to the receptor as a result of the development would arise. It is rated on the following scale:

- Permanent – the change is expected to be permanent and there is no intention for it to be reversed;
- Long-term – the change is expected to be in place for 10-25 years and will be reversed, fully mitigated or no longer occurring beyond that timeframe;
- Medium-term – the change is expected to be in place for 2-10 years and will be reversed, fully mitigated or no longer occurring beyond that timeframe; and
- Short-term – the change is expected to be in place for 0-2 years and will be reversed, fully mitigated or no longer occurring beyond that timeframe.

10.8.18. The Extent of effects is assessed for all receptors and indicates the geographic area over which the effects will be experienced.

10.8.19. The significance of effect would be determined by combining the assessed sensitivity (derived from value of the receptor and susceptibility to the Proposed Scheme) of the landscape or visual receptor with the anticipated magnitude of change (as derived from assessing the scale, extent and duration of impacts) resulting from the Proposed Scheme. Effects would be assessed for the construction phase, operational phase year 1 and at 15 years after commencement of operations and decommissioning to determine changes resulting from the establishment of mitigation planting.

10.8.20. The level of effect resulting from the Proposed Scheme will be assessed as; Substantial, Moderate, Slight, Negligible or Neutral. The nature of the effects will also be determined through professional judgement as; Adverse, Beneficial or Neutral dependent on whether landscape or visual effects will be worse, similar to, or better than the baseline situation. Major changes in the Landscape or Visual amenity will not always be deemed significant, depending on the visual qualities of the Proposed Scheme and its setting.

10.8.21. Landscape proposals will be designed to address identified effects that could reasonably be mitigated through the implementation of landscape measures. Assessment will be undertaken of the predicted significance of residual effects in relation to these identified mitigation measures. Landscape mitigation proposals will be prepared as required to illustrate these measures and included as part of the ES.

10.9. LIMITATIONS AND ASSUMPTIONS

10.9.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- As exact heights and massing of the Proposed Scheme are not confirmed at this stage, the proposed 2km Study Area and viewpoint locations may be subject to change and further refinement as the project progresses. These changes would be agreed and confirmed as part of the EIA Scoping Opinion prior to the commencement of the assessment. It is currently based upon the scoping layout as shown in **Figure 1-2** and project parameters defined in **Chapter 2: Site and Proposed Scheme Description**.
- As the development design progresses and more project detail becomes available, adjustments and refinements will be made to the visual envelope. The current 2km Study Area for the Proposed Scheme is based on a combination of:
    - A preliminary ZTV (OS Terrain 5 DTM – bare earth data) based on a height of 130m, for the Proposed Scheme as shown on **Figure 10-2**.
    - A summer survey capturing suitable viewpoint locations as shown on **Figure 10-2**.
    - Desktop study with the application of professional judgment.
- The assessment of the views from private properties is based on representative viewpoints from publicly accessible locations and professional judgements. A residential amenity survey is not proposed because it is not anticipated that any individual residential properties will experience overbearing visual consequences as a result of the Proposed Scheme.
- Photography used to inform the assessment to date has been taken in May during the summer season. Any further viewpoints that may be requested or required will likely be taken during the winter months where required.

- Photomontages in accordance with TGN 06/19 Type 3 are proposed for up to three viewpoints as agreed with consultees and will represent year 1 and year 15 of operation of the Proposed Scheme. Other viewpoints will be produced as annotated photo-panoramas (Type 1).
- The need for assessment of the effects of lighting on visual amenity during the construction phases will be considered when details become available.

10.10. REFERENCES

Ref 10.1: 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 10.2: Department for 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/1147380/NPS_EN-1.pdf

Ref 10.3: Department for Energy Security & Net Zero (2023) Draft 'Overarching National Policy Statement for Energy (EN-1). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf

Ref 10.4: Stockton-on-Tees Borough Council (2019). Local Plan. Available at: https://www.stockton.gov.uk/local-plan

Ref 10.5: Tees Valley Joint Strategy Unit (2008) Tees Valley Green Infrastructure Strategy. Available at: https://teesvalleynaturepartnership.org.uk/wp-content/uploads/2013/11/Tees-Valley-Green-Infrastructure-Strategy.pdf

Ref 10.6: Department for Environment, Food and Rural Affairs (2023) Biodiversity net gain. Available at: https://www.gov.uk/government/collections/biodiversity-net-gain

Ref 10.7: Council of Europe (2000) The European Landscape Convention (ELC) 2000

Ref 10.8: UK Government (2008) Town and Country Planning Act. Available at: https://www.legislation.gov.uk/ukpga/1990/8/contents

Ref 10.9: UK Government (2000) Countryside and Rights of Way Act 2000. Available at: https://www.legislation.gov.uk/ukpga/2000/37/contents

Ref 10.10: UK Government (2008) Planning Act 2008. Available at: https://www.legislation.gov.uk/ukpga/2008/29/contents

Ref 10.11: Landscape Institute and the Institute of Environmental Management and Assessment (2013) The Guidelines for Landscape and Visual Assessment (GLVIA).

Ref 10.12: Natural England (2014) An Approach to Landscape Character Assessment. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/691184/landscape-character-assessment.pdf

Ref 10.13: Landscape Institute (2019) 'Visual Representation of Development Proposals'. Landscape Institute Technical Guidance Note 06/19. Available at: https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/09/LI_TGN-06-19_Visual_Representation.pdf

Ref 10.14: Stockton on Tees Borough Council (2011) Stockton on Tees Landscape Character Assessment 2011, WYG (2011). Available at: https://www.stockton.gov.uk/media/3151/Landscape-Character-Assessment-Report-with-appendices/pdf/Landscape_Character_Assessment_Report_with_appendices.pdf?m=637889964559870000

Ref 10.15: Middlesbrough Council Landscape and Heritage Assessment 2016, LUC (2016) Available at: https://middlesbrough-council-middlesbrough.opendata.arcgis.com/documents/planning-landscape-and-heritage-assessment/explore

Ref 10.16: Redcar & Cleveland Borough Council Landscape Character SPD, Redcar & Cleveland Borough Council (2010) Available at: https://www.redcar-cleveland.gov.uk/sites/default/files/2022-05/Landscape%20Character%20SPD.pdf

Ref 10.17: The Landmark Partnership (2000) Hartlepool Landscape Assessment. Available at: https://www.hartlepool.gov.uk/download/downloads/id/2967/hlp03_49_hbc_landscape_assessment_2000pdf.pdf

Ref 10.18: Natural England (2014) National Character Assessment 23 Tees Lowlands. Available at: https://nationalcharacterareas.co.uk/tees-lowlands/

Ref 10.19: Natural England (2023) National Character Areas. Available at: https://nationalcharacterareas.co.uk/

View 1: Tees Transporter Trail

Figure 10.5: Panoramic Photographs

Camera Height: 1.7m

Camera Type: Canon EOS 6D Mark II

Focal Length: 50mm

Viewpoint Location (BNG Ref.): NZ 50216, 21380

Distance to nearest Site Boundary: Approx. 30m

Photography Date & Time: 18/05/2023, 11:41

Horizontal FOV: 90°

Document Sheet Size: A3

Project: Lighthouse Green Fuels DCO

View 1: Tees Transporter Trail

View 2: Seaton Carew Road

Figure 10.5: Panoramic Photographs

Camera Height: 1.7m

Camera Type: Canon EOS 6D Mark II

Focal Length: 50mm

Viewpoint Location (BNG Ref.): NZ 50831, 22729

Distance to nearest Site Boundary: Approx. 130m

Photography Date & Time: 18/05/2023 13:41

Horizontal FOV: 90°

Document Sheet Size: A3

Project: Lighthouse Green Fuels DCO

VP 2: Seaton Carew Road

View 3: RSPB Saltholme

Figure 10.5: Panoramic Photographs

Camera Height: 1.7m

Camera Type: Canon EOS 6D Mark II

Focal Length: 50mm

Viewpoint Location (BNG Ref.): NZ 50357, 23009

Distance to nearest Site Boundary: Approx. 660m

Photography Date & Time: 18/05/2023, 12:30

Horizontal FOV: 90°

Document Sheet Size: A3

Project: Lighthouse Green Fuels DCO

VP 3: RSPB Saltholme

View 4: Port Clarence Green Space

Figure 10.5: Panoramic Photographs

Camera Height: 1.7m

Camera Type: Canon EOS 6D Mark II

Focal Length: 50mm

Viewpoint Location (BNG Ref.): NZ 49937, 21718

Distance to nearest Site Boundary: 125m

Photography Date & Time: 18/05/2023, 11:43

Horizontal FOV: 90°

Document Sheet Size: A3

Project: Lighthouse Green Fuels DCO

VP 4: Port Clarence Green Space

View 5: Transporter Bridge

Figure 10.5: Panoramic Photographs

Camera Height: 1.7m

Camera Type: Canon EOS 6D Mark II

Focal Length: 50mm

Viewpoint Location (BNG Ref.): NZ 49960, 21216

Distance to nearest Site Boundary: 200m

Photography Date & Time: 18/05/2023, 14:37

Horizontal FOV: 90°

Document Sheet Size: A3

Project: Lighthouse Green Fuels DCO

VP 5: Transporter Bridge

View 6: Riverside Stadium

Figure 10.5: Panoramic Photographs

Camera Height: 1.7m

Camera Type: Canon EOS 6D Mark II

Focal Length: 50mm

Viewpoint Location (BNG Ref.): NZ 50649, 20709

Distance to nearest Site Boundary: Approx 490m

Photography Date & Time: 18/05/2023, 14:58

Horizontal FOV: 90°

Document Sheet Size: A3

Project: Lighthouse Green Fuels DCO

VP 6: Riverside Stadium

wsp

View 7: Tees Viewpoint

Figure 10.5: Panoramic Photographs

Camera Height: 1.7m

Camera Type: Canon EOS 6D Mark II

Focal Length: 50mm

Viewpoint Location (BNG Ref.): NZ 52141, 21105

Distance to nearest Site Boundary: Approx. 900m

Photography Date & Time: 18/05/2023, 15:25

Horizontal FOV: 90°

Document Sheet Size: A3

Project: Lighthouse Green Fuels DCO

VP 7: Tees Viewpoint

wsp

View 8: Teesmouth NNR

Figure 10.5: Panoramic Photographs

Camera Height: 1.7m

Camera Type: Canon EOS 6D Mark II

Focal Length: 50mm

Viewpoint Location (BNG Ref.): NZ 50775, 25102

Distance to nearest Site Boundary: 1.57km

Photography Date & Time: 18/05/2023, 13:23

Horizontal FOV: 90°

Document Sheet Size: A3

Project: Lighthouse Green Fuels DCO

VP 8: Teesmouth NNR

wsp

11. CULTURAL HERITAGE

11.1. INTRODUCTION

11.1.1. This chapter considers the impacts of the Proposed Scheme on Cultural Heritage during construction and operation, and any potential significant effects. It sets out the proposed methodology for the Cultural Heritage assessment and identifies those impacts that can be scoped out of the assessment. Where necessary, further assessment would be presented in the ES, if required.

11.1.2. Statutory provision for the safeguarding of heritage assets has been made at a national and local level. Heritage assets comprise below and above ground archaeological remains, buildings, structures, monuments or heritage landscapes.

11.2. CONSULTATION

11.2.1. Consultation with Stockton-on-Tees Borough Council (STBC) has not yet been undertaken to inform this scoping chapter. Consultation for the Proposed Scheme was not undertaken as it had already been carried out for the North Tees Works, details of which are provided below.

11.2.2. Consultation with Tees Archaeology on behalf of STBC was undertaken for a previous planning application (22/1041/SOR) for part of the Site that is directly to the west of the North Tees Works oil refinery (the southern portion of the SAF Plant Site) and it was determined that the Site had low archaeological potential and therefore no further archaeological work would be required (**Ref 11.1**). As a result of this consultation cultural heritage and archaeology was also scoped out of Environmental Impact Assessments (EIA) for both Air Products Plc TV1 and TV2 for the previous planning application.

11.3. POLICY, LEGISLATION AND GUIDANCE

11.3.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is detailed in **Table 11-1** as follows:

Table 11-1 – Cultural Heritage – Summary of key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement for Energy (Adopted) 2011 (EN-1) (**Ref 11.2**)	Focuses on the potential of adverse impacts to the historic environment through the construction, operation and decommissioning of energy infrastructure.

Policy / Legislation / Guidance	Description
Overarching National Policy Statement for Energy (Draft) 2023 (EN-1) (**Ref 11.3**)	The Government has published a draft update to EN-1 which is currently under consultation. The approach to historic environment (cultural heritage) is not significantly altered in this update.
National Policy Statement for Electricity Networks Infrastructure (Adopted) 2011 (EN-5) (**Ref 11.4**)	Focuses on assessment and technology-specific information relating to the development of Electricity Networks Infrastructure
National Policy Statement for Electricity Networks Infrastructure (Draft) 2023 (EN-5) (**Ref 11.5**)	The Government has published a draft update to EN-5 which is currently under consultation. The approach to historic environment (cultural heritage) is not significantly altered in this update.
National Planning Policy Framework (NPPF) 2021 (**Ref 11.6**)	Chapter 16: Conserving and enhancing the historic environment identifies national policy for the preservation and conservation of designated and non-designated heritage assets.
Stockton-on-Tees Local Plan (adopted 2019) (**Ref 11.7**)	Local planning policy that highlights key objectives for the local council, which include the following relating to the Historic Environment: ■ Policy HE1 – Conservation and Enjoyment of Historic Environment ■ Policy HE2 – Conserving and Enhancing Stockton's Heritage Assets ■ Policy HE3 – Stockton and Darlington Railway
Legislation	
The Planning (Listed Buildings and Conservation Areas) Act 1990 (**Ref 11.8**)	Sets out legal requirement for the control of development and alterations which affect listed buildings or conservation areas.
Guidance	
Chartered Institute for Archaeologists (CIfA): regulations for professional conduct (CIfA 2021) (**Ref 11.9**)	Ensuring professional conduct in archaeology.
CIfA Standard and guidance for historic environment desk-based assessment (CIfA 2020a) (**Ref 11.10**)	Guidance for producing desk-based assessment.
CIfA Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment (CIfA 2020b) (**Ref 11.11**)	Guidance for archaeological and built heritage consultancy work.

Policy / Legislation / Guidance	Description
Good Practice Advice (GPA) 2 – Managing Significance in Decision-taking (2015) (**Ref 11.12**)	Good Practice Advice which emphasises the requirement for having knowledge and understanding of the significance of heritage assets likely to be affected by development.
GPA 3 – The Setting of Heritage Assets (2017) (**Ref 11.13**)	Good Practice Advice which provides advice on the setting of heritage assets.
Statements of Significance: Historic England Advice Note 12 (2019) (**Ref 11.14**)	Guidance and advice in relation to assessing the significance of heritage assets. 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.
Planning Practice Guidance (2019) (**Ref 11.15**)	Advice and guidance on enhancing and conserving the historic environment.

11.4. STUDY AREA

11.4.1. To determine the historic environmental potential within the Site and in line with standard industry practice, the following Study Area has been applied:

- within the Site, potential for physical impacts to heritage assessed was assessed.
- a 1km radius Study Area around the Site was assessed for effects arising from change within the setting of assets which may affect their heritage significance, and recorded heritage assets which may assist in understanding the archaeological potential of the Site. This 1km Study Area was considered to be sufficient based on professional judgement, due to the urban nature of the Site and the topographic conditions of the area.

11.4.2. As assessment progresses throughout the EIA process this Study Area will be refined based on increased understanding of the historic environment resource and consultation with STBC.

11.4.3. A range of desk-based publicly accessible sources were consulted. This allows the assessment of the likely nature, extent, preservation, and significance of any known or previously unrecorded heritage assets that may be present within the Site. This method will also be applied for considering impacts to heritage asset significance through changes to setting. Where appropriate, reference will be made to key heritage assets beyond the Study Area.

11.4.4. Sources used within this assessment include:

- Heritage Gateway[1];

[1] https://www.heritagegateway.org.uk/gateway/

- National Heritage List for England (NHLE) data[2];
- OS maps on National Library of Scotland (NLS)[3]; and
- Other Online sources.

11.5. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE CONDITIONS

11.5.1. A high-level appraisal of heritage assets has been undertaken to inform the scoping assessment using publicly available information. This is deemed sufficient to identify constraints and key assets which will be considered during design development. Further detailed assessment of heritage assets will be undertaken to inform and as part of the EIA. This will take the form of a full desk based assessment in consultation with the local planning authority and an impact assessment.

11.5.2. There are no designated heritage assets within the Site.

11.5.3. There are two listed buildings immediately adjacent to the Site, which are:

- Grade II* listed Transporter Bridge, which runs across the River Tees, adjacent to the south-western boundary of the Site and to the south of the A178 Port Clarence Road (NHLE: 1139267); and
- Grade II listed Haverton Hill and Port Clarence War Memorial, approximately 150m to the north-west of the southwestern most part of the Site (NHLE: 1439661) at the junction of A1046 Port Clarence Road and West Street.

11.5.4. There are a further 27 listed buildings within the Study Area, including the Grade II* listed Dock Clock Tower (NHLE: 1139871); the remaining 26 assets are Grade II listed. All these assets are located south of the River Tees and relate to the historic development of Middlesbrough. Of these, only three assets have settings which include the Site. These are the Piers, railings and gates at the entrance to the Transporter Bridge (NHLE: 1139846), Winch House, adjoining railings, wall, gates and gatepiers, c.40m south-west of the Transporter Bridge (NHLE: 1139847), and Bridgekeepers House (NHLE: 1139848). These assets all hold a functional relationship to the Transporter Bridge and share its setting.

11.5.5. The settings of the remaining 24 Grade II listed assets and the Grade II* listed Dock Clock Tower do not extend to the Site and would not be affected by the Proposed Scheme. This is due to the intervening urban environment and the nature of the assets themselves which have either a limited extent of setting or have a setting which does not contribute significantly to their heritage value.

[2] https://historicengland.org.uk/listing/the-list/
[3] https://www.nls.uk/

11.5.6. One conservation area is present within the Study Area, this is Middlesbrough Historic Quarter (within Middlesbrough County) and is located approximately 670m south of the Wilton Engineering Wharf element of the Proposed Scheme, on the southern side of the River Tees.

11.5.7. The Teesside and Middlesbrough Historic Environment Record (HER) datasets were not consulted as part of this report. The previous use of the Site is considered to have removed any surviving sub-surface archaeological remains. The Site has been subject to successive periods of development from the Steel works and salt sites recorded on the earliest available Ordnance Survey maps to the present North Tees Works. As the infrastructure of these developments, including roads, tanks, factory buildings, rail tracks, storage tanks, and pipelines and utilities, are all anticipated to have had below ground impacts, these which will have substantially truncated or entirely removed evidence of any archaeological remains related to previous development or human activity (archaeological remains) within the Site. The areas of the Site which have not been previously developed were mudflats unsuitable for development or human occupation and as such no archaeological remains are anticipated. A previous desk-based archaeological assessment concluded that the Site is of low archaeological potential and no further archaeological works would be required, which STBC agreed with (Application number: 22/1041/SOR).

FUTURE BASELINE

11.5.8. The future baseline is not expected to change from the existing baseline described above. This is because buried heritage assets are a static resource, which have reached equilibrium with their environment and do not change (i.e. decay or grow) unless their environment changes as a result of human or natural intervention.

11.5.9. For above ground heritage assets there may be some decay over time in the absence of the Proposed Scheme.

11.5.10. However, the setting of heritage assets may change if future development takes place. Future development could have a detrimental or positive effect on setting and could result in the intervening presence of buildings and/or vegetation.

11.6. SENSITIVE RECEPTORS

11.6.1. The sensitive receptors identified in **Section 11.5**, are as follows:

- Grade II* listed Transporter Bridge (NHLE 1139267);
- Grade II listed Haverton Hill and Port Clarence War Memorial (NHLE: 1439661);
- Grade II* listed Dock Clock Tower (NHLE 1139871);
- Grade II listed Piers, railings and gates at entrance to Transporter Bridge (NHLE: 1139846);
- Grade II listed Winch House, adjoining railings, wall, gates and gatepiers, c.40m south-west of Transporter Bridge (NHLE: 1139847); and

- Grade II listed Bridgekeepers House (NHLE: 1139848).

11.7. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

11.7.1. Any requirements for mitigation and/or protection measures of sensitive receptors will be defined in a Code of Construction Practice (CoCP). The CoCP will provide appropriate mitigation strategies with the aim to reduce or offset any significant adverse effects identified. Mitigation measures may include:

- Monitoring of intrusive ground works by heritage specialists to identify any previously unrecorded heritage assets;
- Excavation and/or recording of assets by appropriately qualified heritage specialists under pre-construction conditions or as construction integrated recording;
- Physical protection measures and transit plans for vehicles or materials coming to and from Site via road or water to avoid or reduce the risk of strikes to listed structures; and
- Hoardings or fencing to reduce or remove temporary visual change within the setting of assets during construction.

11.7.2. Therefore, there is no requirement for further design, mitigation and enhancement measures for non-designated assets or below ground archaeology beyond those defined in the CoCP as there will be no significant effects.

11.8. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

11.8.1. The Transporter Bridge (NHLE 1139267) was constructed during the early twentieth century at the time of significant industrial activity at Port Clarence and would have supported the import and export of goods across the River Tees and further afield. The heritage significance of the bridge is based in its architectural value as an example of industrial engineering and its connections to significant local engineers. Its setting comprises the River Tees and the industrial areas to the north and south of the river. The Proposed Scheme would be consistent with the character of the setting of the asset as would any temporary construction activity. There will be no physical impact to the bridge and the industrial setting will be maintained. The heritage significance of the Tees Transporter Bridge will not be affected by the works and therefore no significant effect is reported.

11.8.2. The settings of Bridgekeeper House, Winch House, and the Piers, railings and gates at the entrance to the Transporter Bridge (NHLE 1139267) may extend to the Site as they share a setting with the Transporter Bridge. However, the Proposed Scheme would result in a negligible alteration to their setting, which would remain industrial in nature. Therefore, their heritage significance would not experience a significant effect.

11.8.3. The Haverton Hill and Port Clarence War Memorial (NHLE 1439661) is a tall obelisk of tan marble in the classical style which stands as a reminder of the impact of the First World War on the community. Its heritage significance is based in its architectural interest and its relationship with the memories of the community within which it sits. The setting of the asset which contributes to its heritage value comprises the A1046 Port Clarence Road and the residential area which surrounds the asset to the north, east, and west, including the green to the immediate east of the asset. The industrial area to the south and south-east of the war memorial (NHLE 1439661), which includes the Site, does not contribute to its heritage significance. As such, the setting of the War Memorial which contributes to its value will not be permanently altered by the Proposed Scheme, nor will its heritage significance be affected by the works within the Site as the setting of the asset does not include this area. Therefore, no significant effect is anticipated.

11.8.4. The settings of the remaining 24 Grade II listed assets and the Grade II* listed Dock Clock Tower do not extend to the Site and would not be affected by the Proposed Scheme. This is due to the intervening urban environment and the nature of the assets themselves, which have either a limited extent of setting or have a setting which does not contribute significantly to their heritage value.

11.8.5. Archaeological below ground remains are not anticipated to survive within the Site due to truncation associated with the previous development as referenced above.

11.8.6. There will be no physical impact to sensitive receptors anticipated and effects arising from the change within the settings of assets are judged to be negligible at most. Therefore, there are no significant effects anticipated to Cultural Heritage during the construction phase of the Proposed Scheme.

OPERATION PHASE

11.8.7. As set out in the construction phase section above and **Section 11.5**, the settings of assets either do not extend to within the Site or would only experience a negligible change. This is because the nature of the Proposed Scheme (within the Site) is consistent with the industrial character of the Study Area. As such, no significant effects are predicted on heritage assets due to change within their setting during the operational phase.

11.8.8. Archaeological below ground remains are only considered within the construction phase due to the nature of the assets (being below ground).

ELEMENTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

Table 11-2 - Elements Scoped in or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Buried heritage assets within the Site	Construction		✔	It is anticipated that any buried assets within the Site will have already been significantly truncated/entirely removed by previous development. Therefore, these effects can be scoped out of the construction phase as no significant remains are anticipated within the Site.
Designated and non-designated heritage assets outside of the Site	Construction and Operation		✔	For some assets (NHLE 1139267, 1139846, 1139847, 1139848), it is judged that activity in the construction phase would be in character with the existing setting and therefore no significant effects are reported. For those assets whose setting includes the Site (NHLE 1139267, 1139846, 1139847, 1139848), it is judged that the Proposed Scheme is consistent with the industrial character of their setting. Therefore, no significant effects have been reported for the operation phase. For other assets within the study area, no significant effects are reported for both the construction and operation phases. This is because no change within their setting is predicted due to the nature of their setting (as described in **Section 11.5**).

11.9. PROPOSED ASSESSMENT METHODOLOGY

11.9.1. As Cultural Heritage will be scoped out of the EIA, no further desk-based or impact assessment is required.

11.10. LIMITATIONS AND ASSUMPTIONS

11.10.1. Due to the works being at scoping stage, only publicly available sources and datasets have been consulted in order to provide an overview of designated and non-designated historic assets within the Site.

11.10.2. Consultation with Tees Archaeology on behalf of STBC was undertaken for a previous planning application (22/1041/SOR) for a part of the Site that is directly to the west of the North Tees Works oil refinery (half of the SAF Plant Site) and it was determined that the Proposed Scheme had low archaeological potential and therefore no further archaeological desk-based or impact assessment work would be required (**Ref 11.1**). It is assumed that the previous consultation opinion for this part of the Site has not

changed in relation to the Proposed Scheme, as the archaeological and heritage baseline has not changed. As a result of this consultation cultural heritage and archaeology was also scoped out of Environmental Impact Assessments (EIA) for both Air Products Plc TV1 and TV2.

11.10.3. No additional consultation with STBC has been undertaken as part of this scoping assessment.

11.10.4. No site visit has been undertaken for this stage of assessment. This was due to the industrial nature of the Site, the previous sub-surface impacts, and the industrial nature of the setting of the assets within the Study Area.

11.11. REFERENCES

Ref 11.1: Consultee Comments for Planning Application 22/1041/SOR. Available at: https://www.developmentmanagement.stockton.gov.uk/online-applications/files/EB272777D868393EC38210BB21E6AC47/pdf/22_1041_SOR-TEES_ARCHAEOLOGY-2386103.pdf

Ref 11.2: Department for Energy Security and Net Zero (Adopted) (2011) 'Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf

Ref 11.3: Department for Energy Security and Net Zero (2023) 'Draft Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf

Ref 11.4: Department of Energy and Climate Change (Adopted) (2011) 'National Policy Statement for Electricity Networks Infrastructure (EN5)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015238/en-5-draft-for-consultation.pdf

Ref 11.5: Department for Energy Security and Net Zero (2023) 'Draft National Policy Statement for Electricity Networks Infrastructure (EN-5)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147384/NPS_EN-5.pdf

Ref 11.6: 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 11.7: Stockton-on-Tees Borough Council (2019) Local Plan. Available at: https://www.stockton.gov.uk/media/2518/Local-Plan-2019/pdf/Local_Plan_2019.pdf?m=637810468860870000

Ref 11.8: UK Government (1990). Planning (Listed Buildings and Conservation Areas) Act 1990. Available at: https://www.legislation.gov.uk/ukpga/1990/9/contents

Ref 11.9 :Chartered Institute for Archaeologists (CIfA) (2021) 'Regulations for professional conduct'. Available at: https://www.archaeologists.net/sites/default/files/Regulations%20for%20professional%20conduct.pdf,

Ref 11.10: Chartered Institute for Archaeologists (CIfA) (2020a) 'Standard and guidance for historic environment desk-based assessment'. Available at: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf,

Ref 11.11: Chartered Institute for Archaeologists (CIfA) (2020b) '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%26GCommissioning_2.pdf,

Ref 11.12: Historic England (2015) 'Managing Significance in Decision-Taking'. Available at: https://historicengland.org.uk/images-books/publications/gpa2-managing-significance-in-decision-taking/gpa2/

Ref 11.13: Historic England (2017) 'The Setting of Heritage Assets'. Available at: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/

Ref 11.14: Historic England (2019) 'Statements of Heritage Significance: Historic England Advice Note 12'. Available at: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets/

Ref 11.15: Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government (2019) 'Planning Practice Guidance: Historic Environment'. Available at: https://www.gov.uk/guidance/conserving-and-enhancing-the-historic-environment

12. GREENHOUSE GAS

12.1. INTRODUCTION

12.1.1. This chapter considers the impacts and any potential significant effects of the Proposed Scheme on Greenhouse Gases (GHG) during construction, operation and decommissioning. 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 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 its contribution to Climate Change. This is carried out through the GHG Emissions assessment. The consideration for the vulnerability of the Proposed Scheme to climate change is addressed in **Chapter 13: Climate Change 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 in **Table 12-1**.

Table 12-1 – Greenhouse Gas - Summary of key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Infrastructure Carbon Review, 2013 (**Ref 12.2**)	In 2013, the UK government published the Infrastructure Carbon Review (HM Government, 2013), 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.

Policy / Legislation / Guidance	Description
	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 Infrastructure Carbon Review also led to the publication of a Publicly Available Specification on infrastructure carbon management; PAS2080:2016. An updated version of PAS2080 was released in 2023.
The Overarching National Policy Statement for Energy (EN-1) (**Ref 12.3**) and the National Policy Statement for Natural Gas Electricity Generating Infrastructure (EN-2) (**Ref 12.4**)	Part 3 of EN-1 'The need for new nationally significant energy infrastructure projects' defines and sets out the 'need' for nationally significant energy infrastructure. Paragraph 3.1.1 states that the UK needs all types of energy infrastructure covered by the NPS in order to achieve energy security at the same time as dramatically reducing greenhouse gas emissions. Paragraph 3.1.2 states that it is for industry to propose the type of energy infrastructure and that the Government does not consider it appropriate for planning policy to set targets for or limits on different technologies. EN-2 recognises the role of fossil fuel generating stations in the transition of the UK to a low carbon economy by providing reliable electricity supplies and a secure and diverse energy mix. It highlights the effectiveness of reducing fossil fuel generating stations' carbon emissions through development and deployment of carbon capture and storage technologies. It states that "*It is Government policy that all new coal-fired generating stations should be required to capture and store the carbon emissions from a substantial proportion of their capacity."*
The Draft National Policy Statement for Energy (EN-1) (**Ref 12.5**)	Draft revised NPSs for energy infrastructure were published by the Government for consultation in September 2021, partly in response to the Government's legally binding commitment to achieve net zero in terms of greenhouse gas emission by 2050. EN-1 recognises the urgent need for new carbon capture and storage (CCS) infrastructure to support the transition to a net zero economy and states that *"The Committee on Climate Change Committee states CCS is a necessity not an option. As well as its role in reducing emissions associated with generating electricity from natural gas (see paragraph 3.3.49), CCS infrastructure will also be needed to capture and store carbon dioxide from hydrogen production from natural gas, industrial processes, the use of Bioenergy with carbon capture and storage (BECCS) and from the air (DACCS)."*
The National Planning Policy Framework (NPPF) (**Ref 12.6**)	Explains that achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives). One of the three objectives is an environmental objective (with the other two being economic and social), which includes the objective of *"mitigating and adapting to climate change, including moving to a low carbon economy"* (paragraph 8). Section 11, Paragraph 120 of the NPPF notes that planning policies and decisions 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*

Policy / Legislation / Guidance	Description
	ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure." Paragraph 154 provides that *"New development should be planned for in ways that: … b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design."* Paragraph 158 provides that *"When determining planning applications for renewable and low carbon development, local planning authorities should: a) not require applicants to demonstrate the overall need for renewable or low carbon energy…; and b) approve the application if its impacts are (or can be made) acceptable."* Whilst paragraph 5 of the NPPF confirms the framework does not contain specific policies for nationally significant infrastructure projects, it is identified that the policies contained in the NPPF may include other matters that are relevant. Accordingly, the Secretary of State may determine that the policies of the NPPF in relation to climate change, in addition to those contained in local planning policy, discussed below, are relevant to their determination of the DCO Application for the Proposed Scheme.
UK Net Zero Strategy (**Ref 12.7**)	This strategy sets out policies and proposals for decarbonising all sectors of the UK economy to meet a net zero target by 2050. The strategy includes an ambition to deliver four carbon capture, usage and storage (CCUS) clusters, capturing 20-30 MtCO2/year across the economy, including 6 MtCO2/year of industrial emissions, per year by 2030. Teesside and the Humber, Merseyside and North Wales are identified among potential carbon capture cluster locations.
Industrial Decarbonisation Strategy (**Ref 12.8**)	This is the first strategy published by a major economy, which sets out how industry can decarbonised in line with net zero, while remaining competitive and without pushing emissions abroad. It builds on the Ten Point Plan and sets out the Government's vision for a prosperous, low carbon UK industrial sector by 2050, and aims to provide industry with the long-term certainty it needs to invest in decarbonisation. Chapter 4 'Adopting low-regret technologies and building infrastructure' states *"To be on track to deliver net zero, we expect that the minimum, in all future scenarios, is 20 TWh per year of fossil fuel use replaced with low carbon alternatives in 2030"*. It goes onto state that *"Current evidence strongly suggests that, given limited sustainable biomass supply, we may need to prioritise the use of biomass where it can be combined with carbon capture and storage (BECCS), resulting in negative emissions".*
Jet Zero Strategy (**Ref 12.9**)	The Strategy sets out the Government's vision for decarbonising aviation, focussing on the development of technologies in a way that maintains the benefits of air travel, especially post COVID 19, whilst maximising the opportunities that decarbonisation can bring for the UK. It includes a 5-year delivery plan, setting out how the Government will achieve net zero aviation by 2050.

Policy / Legislation / Guidance	Description
Stockton-on-Tees Local Plan (**Ref 12.10**)	Chapter 8: Natural, Built and Historic Environment Policy ENV1 – Energy Efficiency Under this policy, 1b requires, *"all major development to demonstrate how they contribute to the GHG emissions reduction targets set out in Stockton-on-Tees' Climate Change Strategy 2016*".
Net Zero Strategy for Tees Valley (**Ref 12.11**)	Five local authorities (Darlington, Hartlepool, Middlesbrough, Stockton-on-Tees and Redcar & Cleveland) forms the regional Tees Valley Combined Authority. The Local Industrial Strategy sets an overarching ambition - *"Tees Valley will be a global leader in clean energy, low carbon and hydrogen. The area will achieve a Net Zero carbon industrial cluster by 2040, providing good jobs with long-term prospects that local people can access."*
Legislation	
United Nations Framework Convention on Climate Change (**Ref 12.12**)	The UK is a member of the United Nations Framework Convention on Climate Change ('UNFCCC') which drives international action on climate change. The UK has pledged to reduce Emissions under the 'Paris Agreement' in 2015, as a part of a joint pledge by members of the EU. This provides an overarching commitment by the UK.
The Climate Change Act (2008), as amended 2019 (**Ref 12.13**)	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 addition, in June 2019 the UK Government updated this commitment to net zero Emissions by 20501.
Guidance	
Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (**Ref 12.14**)	EIA Guidance published by IEMA in 2022 will be followed. This provides a framework for the consideration of GHG emissions in the EIA process, in line with the 2014 European Union (EU) Directive. The guidance sets out how to: ■ Identify the GHG emissions baseline in terms of GHG current and future emissions; ■ Identify key contributing GHG sources and establish the scope and methodology of the assessment; ■ Assess the impact of potential GHG emissions and evaluate their significance; and ■ Consider mitigation in accordance with the hierarchy for managing project related GHG emissions (avoid, reduce, substitute, and compensate).

Policy / Legislation / Guidance	Description
The GHG Protocol (**Ref 12.15**)	The GHG Protocol provides overarching guidance on developing GHG inventories and reporting standards.

12.3. STUDY AREA

12.3.1. In line with best practice EIA Guidance published by IEMA (**Ref 12.14**), the study boundaries have been established to cover all lifecycle modules of the Proposed Scheme.

12.3.2. The assessment of GHG is not restricted by geographical area but instead includes any increase or decrease in emissions as a result of the Proposed Scheme, wherever that may be. This includes:

- Construction emissions 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; and
- Operational emissions (increase or reduction) which result from the operation of the Proposed Scheme and any shifts in energy usage which may occur. In this case, GHG emissions include those for embodied emissions arising from materials and waste for the operation of Proposed Scheme, operational energy and water use.

12.4. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

12.4.1. GHG emissions occur constantly and widely as a result of natural and human activity including land use and land use change, and energy consumption (e.g., fossil fuels, purchased energy from the grid and/or other sources) and industrial processes. The GHG assessment would only consider instances in which the Proposed Scheme results in additional or avoided emissions in comparison to the baseline scenario. The baseline conditions therefore focus on those sources of emissions subject to change between the baseline scenario and the Proposed Scheme.

12.4.2. The latest industrial GHG emissions for 2020 within Stockton-on-Tees, North-East, and the UK (**Ref 12.16**) are presented in **Table 12-2**. These emissions have only been provided for context and are not the baseline emissions for this assessment.

Table 12-2 – Industrial emissions (2020) for Stockton-on-Tees, North-East, and the UK

Emissions Sources	Stockton-on-Tees ($ktCO_2e$)	North-East ($ktCO_2e$)	UK ($ktCO_2e$)
Industry Electricity	84.0	645.9	12,309.4
Industry Gas	107.4	978.3	14,202.5
Large Industrial Installations	1,550.9	2,648.2	29,854.9
Industry 'Other'	42.5	472.5	16,903.1
Industry Total	**1,784.8**	**4,745.0**	**73,269.9**

12.4.7. There is preconstruction enabling works (demolition activities) set to take place on Site, however this has been consented under a separate scheme and is therefore not within the scope of works of this Proposed Scheme.

12.4.8. Therefore, the baseline scenario in this case, involves no site activities and therefore the construction baseline is zero emissions.

FUTURE BASELINE

12.4.9. The future baseline scenario will assume that there is no change to the existing operation of the Material Recycling Facility (MRF) currently on Site.

12.4.10. At present, operational data for the MRF is not available, but will be reported in the next stages of the GHG assessment in the PIER and ES.

12.5. SENSITIVE RECEPTORS

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 GHGs 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 ENCHANCEMENT MEASURES

12.6.1. Carbon reduction through mitigation is an important aspect of all developments, as per the proposed assessment methodology (**Section 12.8**), the GHG significance is based on the Proposed Scheme's ability to achieves emissions mitigation.

CONSTRUCTION PHASE

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

- Design optimisation to reflect the carbon reduction hierarchy (clause 4 of BSI (2023) Publicly Available Specifications: 2080 Carbon management in Infrastructure, hereafter referred to as PAS 2080) (**Ref 12.17**);
- 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 mechanical and electrical equipment such as lighting and telecommunications that is long-lasting and based on 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;
- Employing local workers and encouraging the use of low carbon transportation or shared transportation delivered through an outline Construction Traffic Management Plan (for further details see **Chapter 18: Traffic and Transport**); and
- 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 PEIR and ES, and these may include:

- Specifying high efficiency mechanical and electrical equipment such as lighting and telecoms;
- 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); and
- 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 tree planting within the Site, where practical to sequester carbon from the atmosphere.

12.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

12.7.1. The GHG Scoping process follows the principles of PAS 2080 (**Ref 12.17**) and BS EN 17472 (**Ref 12.18**); which breakdown potential emissions sources (of each phase) into lifecycle stages, which are as set out in **Table 12-3**, **Table 12-4** and **Table 12-5**. The scoping of the potential emissions is overall a proportionate one to ensure the GHG assessment at the next stage accounts for likely significant GHG emissions effects and is based on a combination of available information / evidence and professional judgement.

CONSTRUCTION PHASE

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

Table 12-3 - Key Emissions Sources in Construction Phase

Emissions Sources	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 on Site.
Transport of waste (A5)	Emissions from fuel/energy used in vehicles transporting waste materials from construction, demolition (removal of any unsuitable existing infrastructure on-Site) and excavation, to destinations away from the Site.
Disposal of waste (A5)	Emissions from the demolition and excavation.
Land use, land use change and forestry (A5)	Emissions associated with the clearance and disposal of vegetation (grass and shrub) due to the Proposed Scheme.

OPERATION (USE) PHASE

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

Table 12-4 - Key Emissions Sources in Operation Phase

Emissions Sources	Potential Sources of Emissions (Not Exhaustive)
Operation (B1)	In operation, domestic and commercial waste (in the form of pelletized SRF feedstock and/or waste biomass) will be converted into SAF. Emissions will arise from the waste (and associated processes) consumed to create SAF.

Emissions Sources	Potential Sources of Emissions (Not Exhaustive)
	Emissions will arise from the transport of raw input waste feedstock, some of which will be sourced nationally from other MRFs across the UK and transferred by rail to the Teesside region rail terminal. The pelletized feedstock is then transferred to the main facility within the Site via conveyors to be installed between the rail terminal and the SAF Plant. This is also transferred to the Waste Feedback Storage Silos.
Maintenance, repair, replacement, refurbishment (B2-5)	Embodied emissions and emissions from transport and plant associated with maintenance, repair, replacement, and refurbishment.
Operational Energy Use (B6)	Emissions resulting from the energy used in the facilities e.g., heating and cooling, ventilation, lighting, fuel for the backup power generators, and plant and equipment to power the critical loads.
Operational Water Use (B7)	Emissions from the use of water for the plant (process water and domestic water consumption).
Land use, land use change and forestry (B8)	Change in emissions associated with the existence of the Proposed Scheme preventing or promoting the sequestration of carbon dioxide into biomass.
Solvent used for the Carbon Capture process (B8)	Solvent materials required for the operation of the Proposed Scheme would result in embodied GHG emissions.
End-user emissions (B9/D)	Emissions arising from the end use of SAF. Emissions associated with the transportation of the captured CO_2 off-Site to its end use (storage0).
Decommissioning process (C1)	Emissions from decommissioning work (i.e., fossil fuel and electricity).
Transport and disposal of materials (C2-4)	Emissions sources as fuel/energy consumption from the transport of materials to disposal sites or recovery.

DECOMMISSIONING PHASE

12.7.6. The potential likely significant effects associated with the decommissioning phase include:

Table 12-5 - Key Emissions Sources in Decommissioning Phase

Emissions Sources	Potential Sources of Emissions (Not Exhaustive)
Decommissioning process (C1)	Emissions from decommissioning work (i.e., fossil fuel and electricity consumed).

Transport and disposal of materials (C2-4)	Emissions sources as fuel/energy consumption from the transport of materials to disposal sites or recovery.

SUMMARY OF EMISSION SOURCE SCOPING FOR FURTHER ASSESSMENT

12.7.9. The anticipated emission sources scoped in, or out, for greenhouse gases are as follows:

Table 12-6 - Elements Scoped in or Out of Further Assessment

Emissions Sources	Phase	Scoped In	Scoped Out	Justification
Product stage (manufacture and transport of raw materials to suppliers) (A1-3)	Construction	☑		Raw materials usage required for the Proposed Scheme would result in embodied emissions and 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 a result of demolition and excavation activities as it will be mostly inert waste.
Land use, land use change and forestry (A5)	Construction		☑	Emissions from the disposal of vegetation are not expected to be large.
Operation (B1)	Operation	☑		Emissions from operational processes of the facilities are expected to amount to a notable quantity.
Maintenance, repair,	Operation		☑	The Proposal Scheme is not designed with the expectation of any significant

Emissions Sources	Phase	Scoped In	Scoped Out	Justification
replacement, refurbishment (B2-5)				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.
Operational Energy Use (B6)	Operation	☑		Electricity will be required from the grid to power the facility, and use of natural gas. It is expected that there will be backup power generators, enough to power the critical loads in the event of power failure. This is considered to occur infrequently, however, there will be intermittent testing of the backup systems, emissions arising from this element is not expected to be large.
Operational Water Use (B7)	Operation	☑		A potentially notable quantity of process water would be required for operation of the Proposed Scheme.
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 Carbon Capture process (B8)	Operation	☑		Solvent materials required for the operation of the Proposed Scheme would result in embodied GHG emissions and have the potential to be large.
End-user emissions (B9/D)	Operation	☑		Emissions associated with the use of SAF have the potential to be large and are proposed to be scoped In. Carbon captured will be processed onsite, and directed to permanent storage, emissions associated with transportation of the captured CO_2 off-Site to a suitable storage facility have the potential to be large and is therefore scoped in for assessment. The final storage of captured CO_2 and the development of the proposed storage locations are outside the scope of this assessment and will therefore not be assessed. This is expected to be covered

Emissions Sources	Phase	Scoped In	Scoped Out	Justification
				under separate planning considerations and application(s).
Decommissioning process (C1)	Decommissioning		☑	The effects of the decommissioning phase of the Proposed Scheme have been scoped out due to the Proposed Scheme's design life of 30 years and uncertainties around deconstruction techniques at the Proposed Scheme's end of life 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.
Transport and disposal of materials (C2-4)	Decommissioning		☑	

12.8. PROPOSED ASSESSMENT METHODOLOGY

12.8.1. The assessment approach for the Proposed Scheme will be discussed, and agreement sought, with Stockton-on-Tees Borough Council and the Environment Agency.

12.8.2. The assessment approach considers the likely magnitude of GHG emissions (or avoided emissions) in comparison to the baseline scenario without the Proposed Scheme. It considers emissions throughout the lifecycle of the Proposed Scheme including:

- Construction phase; e.g., embodied emissions associated with materials, transportation of materials to Site and waste/arisings from Site, and the construction process; and
- Operational phase; e.g., operation of the plant, maintenance, and replacement of original materials; and
- Decommissioning phase: e.g., use of plant and equipment to dismantle the Proposed Scheme, transportation, and disposal of materials.

12.8.3. For all 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 (e.g., CCS) for the baseline scenario and for the Proposed Scheme. In each case this will cover the whole study period (minimum design life of 30 years); and
- Calculation of the GHG emissions by applying a suitable emissions factor (tCO_2e per unit of emissions generating activity).

12.8.4. Emissions calculations will focus on emissions annually and throughout the Proposed Scheme lifecycle. Values will be reported as tonnes of carbon dioxide equivalents (tCO_2e).

12.8.5. The assessment of construction and operation impacts will be undertaken in line with the following guidance:

- ISO 14064-1:2018 (**Ref 12.19**);
- GHG Protocol (**Ref 12.15**);
- IFC Environmental, Health, and Safety Guidelines for Thermal Power Plants (**Ref 12.20**);
- IPCC Guidelines for National Greenhouse Gas Inventories (**Ref 12.21**); and
- PAS 2080 (**Ref 12.17).**

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 12.14**); a project'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 the project's 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. The following terms have been used to define the significance of the effects identified as set out in IEMA guidance:

- **Major adverse (significant):** the GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy and does not make a meaningful contribution to the UK's trajectory towards net zero;
- **Moderate adverse (significant):** the GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals, falling short of fully contributing to the UK's trajectory towards net zero;
- **Minor adverse (not significant):** the GHG impacts are fully consistent with applicable existing and emerging policy requirements and good practice design standards, fully in line with measures necessary to achieve the UK's trajectory towards net zero;
- **Negligible (not significant):** the GHG impacts are reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050; and
- **Beneficial (significant):** the net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline, substantially exceeding net zero requirements with a positive climate impact.

12.8.9. 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 (**Table 12-7**) (**Ref 12.22**), which have been set by the UK Government covering 2023 to 2037.

Table 12-7 - Key Emissions Sources in construction stage

Carbon Budget Period	UK Carbon Budget (MtCO2e)
Fourth: 2023-2027	1,950
Fifth: 2028-2032	1,725
Sixth: 2033-2037	965

12.9. LIMITATIONS AND ASSUMPTIONS

12.9.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- The provision of the following data provided by the design and engineering teams for the assessment undertaken for the Greenhouse Gases assessment in the PEIR / ES:
    - Emissions occurring at the Site from the operation of the plant;
    - The emissions intensity for the power which would be used for the parasitic load; and
    - The amount of carbon emissions captured by the Proposed Scheme.
- The assessment is expected to take place before the detailed design is finalised and a contractor selected, where data or information is unknown, assumptions will be made and industry standard benchmarks may be used if appropriate;
- In the consideration of scoping of End-user Emissions (B9/D) – It is highly likely that the carbon captured would be transferred a short distance, via the CO_2 pipeline being developed as part of the NZT project, to permanent storage being developed as part of the NZT cluster. The emissions arising from the transportation of the captured CO_2 would be minimal. However, due to uncertainty around the status of the NZT project upon operation of the Proposed Scheme, transportation of the Captured CO_2 has been scoped in for assessment. Further details on the assumptions around NZT are provided in **Chapter 2: Site and Proposed Scheme description**;
- The final storage of captured carbon and the development of the proposed storage at any storage facility would have been consented separately and therefore outside the scope of this assessment; and
- The assessment of significance will be based, in part, on professional judgement.

12.10. REFERENCES

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Ref 12.2 - 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

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Ref 12.5 - Department for Energy Security & Net Zero (2023) 'Draft Overarching National Policy Statement (NPS) for Energy EN-1'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf

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Ref 12.11 - Tees Valley Combined Authority. (2023) Net Zero Strategy for Tees Valley. Available at: https://teesvalley-ca.gov.uk/business/wp-content/uploads/sites/3/2023/03/Net-Zero-strategy-Digital.pdf

Ref 12.12 - United Nations Climate Change. (no date). United Nations Climate Change webpage. Available at: UNFCCC

Ref 12.13 - UK Government. (2019). The Climate Change Act 2008 (2050 Target Amendment) Order 2019. Available at: https://www.legislation.gov.uk/ukdsi/2019/9780111187654

Ref 12.14 - IEMA. (2022) Assessing Greenhouse Gas Emissions and Evaluating Their Significance. Available at: https://www.iema.net/

Ref 12.15 - Greenhouse Gas Protocol. (Various). Available at: https://ghgprotocol.org/

Ref 12.16 - UK Government, Department for Business, Energy & Industrial Strategy. (2020) UK greenhouse gas emissions local authority and regional statistics 2020. Available at: UK local authority and regional greenhouse gas emissions national statistics, 2005 to 2020 - GOV.UK (www.gov.uk)

Ref 12.17 - BSI. (2023) Publicly Available Specifications: 2080 Carbon management in Infrastructure. Available at: https://pas_2080_guidance_document_april_2023.pdf

Ref 12.18 - BSI. (2022) BS EN 17472:2022 Sustainability of construction works. Sustainability assessment of civil engineering works. Calculation methods. Available at: https://www.en-standard.eu/bs-en-17472-2022-sustainability-of-construction-works-sustainability-assessment-of-civil-engineering-works-calculation-methods/

Ref **12.19** - ISO. (2018) ISO Standard 14064-1:2018 Greenhouse gases. Available at: https://www.iso.org/standard/66453.html

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Ref 12.22 - Department of the Environment, Climate and Communications (2022) Carbon Budgets. Available at: https://www.gov.ie/en/publication/9af1b-carbon-budgets/

13. CLIMATE RESILIENCE

13.1. INTRODUCTION

13.1.1. This chapter considers the impacts of climate on the Proposed Scheme during construction and operation, and any potential significant effects. It sets out the proposed methodology for the climate resilience 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 - Climate Resilience – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Draft Overarching National Policy Statement for Energy (EN-1) 2023 **(Ref 13.1)**	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 should take the effects of climate change into account when developing and consenting infrastructure. **Paragraph 4.9.1** states that: *"Climate change mitigation is essential to minimise the most dangerous impacts of climate change, however previous global GHG emissions have already committed us to some degree of continued climate change. If new energy infrastructure is not sufficiently resilient against the possible impacts of climate change, it will not be able to satisfy the energy needs as outlined in Part 3 of this NPS.*" **Paragraph 4.9.8** states that: *"New energy infrastructure will typically be a long-term investment and will need to remain operational over many decades, in the face of a changing climate. Consequently, applicants must consider the direct (e.g. site flooding, limited water availability, storms, heatwave and wildfire threats to infrastructure and operations) and indirect (e.g. access roads or other critical dependencies impacted by flooding, storms, heatwaves or wildfires) impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of new energy infrastructure."* **Paragraph 4.9.12** states that: *"Where energy infrastructure has safety critical elements (for example parts of new gas-fired power stations or some electricity sub-stations), the applicant should apply a credible maximum*

Policy / Legislation / Guidance	Description
	climate change scenario. It is appropriate to take a risk-averse approach with elements of infrastructure which are critical to the safety of its operation." **Paragraph 4.9.13** states that: *"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. This should cover the estimated lifetime of the new infrastructure, including any decommissioning period."*
Overarching National Policy Statement for Energy EN-1 2011 (**Ref 13.2**)	Sets out the Government's policy for delivery of major energy infrastructure and will be the primary basis for decision making. **Paragraph 4.8.5** states that: "*New energy infrastructure will typically be a long-term investment and will need to remain operational over many decades, in the face of a changing climate. Consequently, applicants must consider the impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of new energy infrastructure. The ES should set out how the proposal will take account of the projected impacts of climate change."* **Paragraph 4.8.6** States that *"Applicants should apply as a minimum, the emissions scenario that the Independent Committee on Climate Change suggests the world is currently most closely following – and the 10%, 50% and 90% estimate ranges. These results should be considered alongside relevant research which is based on the climate change projections."* **Paragraph 4.8.9** states that: *"Where energy infrastructure has safety critical elements, the applicant should apply the high emissions scenario… it is appropriate to take a more risk-averse approach with elements of infrastructure which are critical to the safety of its operation."*
Climate Change Adaptation: Policy Information 2021 (**Ref 13.3**)	The policy paper states that: *"Preparing for a changing climate, or climate adaptation, will help the UK to reduce negative consequences of climate change and take advantage of new opportunities. Building the UK's preparedness and resilience to climate change impacts is a cost-effective and essential way to protect our people, economy and environment."* **Section 2** provides an overview of how the UK is preparing for climate change. These include commitments to understanding the risks through the UK Climate Change risk assessment, preparing for climate change through the National Adaptation Programmed, adapting services and infrastructure under the Adaptation Reporting Power (ARP). In **Section 4**, the policy paper refers to the climate evidence, tools and research including the UK Climate Projections 2018 and the UK Climate Resilience Programme

Policy / Legislation / Guidance	Description
National Planning Policy Framework (NPPF) 2021 (**Ref 13.4**)	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.** **Paragraph 152** states that: *"Plans should support in the contribution 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 153 Planning for Climate Change** states that: *"Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure".* In addition, **paragraph 169** states that: *"Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should: a) take account of advice from the lead local flood authority; b) have appropriate proposed minimum operational standards; c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and d) where possible, provide multifunctional benefits."*
The National Adaptation Programme 2018 (**Ref 13.5**)	The National Adaptation Programme (NAP) sets the actions that government and others will take to adapt to the challenges of climate change in the UK. It sets out key actions for a five year period. **Section 4.2** addresses the importance of the NPPF in supporting climate change adaptation for development.
Middlesborough Local Development Framework: Core Strategy (2008) (**Ref 13.6)**	This document sets out the expectation for development in Middlesborough to contribute to reducing the impacts of climate change under **Policy CS4 (Sustainable development)**. **Policy CS4** states that: *"All development will be required to contribute to achieving sustainable development principles by, where appropriate: (l) delivering development of a high quality design that contributes to improvements in the quality of the townscape; (m) ensuring that inappropriate development is not carried out in the floodplain and that sustainable methods of surface drainage are used. This should include the incorporation of Sustainable Drainage Systems in new developments to mitigate against localised flooding, promote water conservation and help*

Policy / Legislation / Guidance	Description
	protect water quality; and (o) contributing to reducing the causes and impacts of climate change."
Climate Change: Strategy for Stockton-on-Tees (2016-2021) (**Ref 13.7**)	The Stockton-on-Tees Climate Change Strategy and Action Plan is one of three underpinning strategies to support the Green Vision 'to achieve a healthy, vibrant and successful low carbon community, resilient to the challenges of climate change and resource pressures', as the overarching vision for environment, sustainability, climate change and fuel poverty. The strategy includes key objectives to identify and minimise climate risks (**Section 5: Our priorities for climate change**), these include mapping risk, business continuity planning, strategic planning for climate adaptation and protecting communities.
North East England Climate Change Adaptation Study (2008) (**Ref 13.8**)	The study provides North East England with a clear picture of what changes are likely in the years ahead, what areas will be most affected and what we need to do now to prepare and adapt. **Section: Adaptation (page 14)** highlights the importance of inspection, monitoring and maintenance of assets, warnings to enable preventative actions and physical adaptation in the use or structure of buildings and in infrastructure (including resilient reinstatement and climate change allowances for hard and soft solutions).
Legislation	
Climate Change Act 2008 (**Ref 13.9**)	The Climate Change Act 2008 sets targets for reducing the UK's impacts on climate change and the need to prepare for managing such impacts and *"make provision about adaptation to climate change".* 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 be ready for the challenges of climate change.
Guidance	
National Planning Practice Guidance (NPPG): Climate Change 2019 **(Ref 13.10)**	Explains the processes and tools that can be used through the planning system in England. The **Guidance on Climate Change** advises how to identify suitable mitigation and adaptation measures in the planning process. According to the guidance *"Addressing climate change is one of the core land use planning principles which the National Planning Policy Framework expects to underpin both plan-making and decision-taking".* The NPPF requires local planning authorities with strategies to mitigate and adapt to climate change in line with

Policy / Legislation / Guidance	Description
	the objectives of the Climate Change Act 2008. There is a statutory requirement and duty on local planning authorities to include policies in their Local Plan designed to tackle climate change and its impacts. **Paragraph: 003 Reference ID: 6-003-20140612** recommends considering future climate risks when allocating development sites to ensure risks are understood over the development's lifetime. **Paragraph: 005 Reference ID: 6-005-20140306** recommends building in flexibility to allow future adaptation if it is needed, such as setting back new development from rivers so that it does not make it harder to improve flood defences in future and the considering the potential vulnerability of a development to climate change risk over its whole lifetime
EIA Guide to: Climate Change Resilience and Adaptation 2020 (**Ref 13.11**)	Hereafter referred to as 'the IEMA Guidance'. This guide provides a framework for the effective consideration of climate change resilience and adaptation in the EIA process. This guide has been used within the assessment approach. This includes the recommended approach of using a high emission scenario of RCP8.5 at the 50th percentile for the 2080s providing a suitable conservative approach to the climate assessment; identifying climate change vulnerability and sensitivity of receptors at scoping stage; undertaking a significance assessment at ES stage; and developing additional adaptation/EIA mitigation measures at ES.
ISO 14091:2021 Adaptation to climate change – Guidelines on vulnerability, impacts and risk assessment. (**Ref 13.12**)	This international standard provides guidelines on approaches to assess climate change-related risks. It highlights the role of risk assessments in improving climate change adaptation planning and informing climate change adaptation activities from their implementation through to monitoring.

13.3. STUDY AREA

13.3.1. 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 defined as the Site.

13.3.2. In the context of a climate resilience assessment, all elements of the Proposed Scheme are located within a relatively close proximity of each other. Therefore, the same baseline conditions and future baseline (projections) apply for all Proposed Scheme elements.

13.3.3. The climate resilience assessment explores the potential impacts of changing climate on the Proposed Scheme, and therefore considers both current and future baseline conditions to account for the full extent of climate impacts on the Proposed Scheme. This climate resilience assessment examines the potential impacts of climate at various temporal scales for the construction, operation and

decommissioning phases of the Proposed Scheme, accounting for short, medium and long-term changes in climate.

13.4. BASELINE CONDITIONS AND FUTURE BASELINE

13.4.1. The IEMA Guidance (**Ref 13.11**) identifies the need for the baseline to consider:

- The current climate baseline (defined by historic climate conditions) to provide an indication of past vulnerability; and
- The future climate baseline (short-term extremes and long-term variation) to assess a project's vulnerability to climate change.

13.4.2. This section provides an overview of the current baseline conditions for the site of the Proposed Scheme using weather station data, and the projected future changes in the climate for the Study Area.

CURRENT BASELINE

13.4.3. This section includes the climate trends over the past three decades (1991-2020) for temperature, precipitation (rain and snow), wind, humidity and solar radiation. This provides an understanding of how recent climate trends have impacted the Study Area. This is presented for both the UK context as well as the local climate, as represented by Stockton-on-Tees weather station (**Ref 13.13**).

UK Context

13.4.4. According to the latest State of the UK Climate Report (**Ref 13.14**), the UK's climate is changing, with recent decades warmer, wetter and sunnier than the 20th century. The Report highlights that the UK has warmed at a broadly consistent (but slightly higher) rate than the observed change in global mean temperature. The key findings from the latest 2021 report are:

- All the top ten warmest years for the UK in the series from 1884 have occurred this century.
- The most recent decade (2012–2021) has been on average 0.2°C warmer than the 1991–2020 average and 1.0°C warmer than 1961–1990.
- The most recent decade (2012–2021) had 5% fewer days of both air and ground frost compared to the 1991–2020 average, and 21% or 18%, respectively, fewer compared to 1961–1990.
- The most recent decade (2012–2021) had 2% fewer heating degree days[1] per year on average compared to 1991–2020, and 11% fewer compared to 1961–1990.

[1] A degree day is an integration of temperature over time. Heating degree days (HDD) is the day-by-day sum of number of degrees by which the mean temperature is less than 15.5°C

- Five of the ten wettest years for the UK since 1836 have occurred this century.
- For the most recent decade (2012–2021) UK winters have been on average 10% wetter than 1991–2020 and 26% wetter than 1961–1990.
- Widespread and substantial snow events have occurred in 2021, 2018, 2013, 2010 and 2009, but their number and severity have generally declined since the 1960s.
- For the most recent decade (2012–2021) UK winters have been 3% sunnier than 1991–2020 and 13% sunnier than 1961–1990.
- The UK annual mean wind speed from 1969 to 2021 shows a downward trend, consistent with that observed globally. However, this series must be interpreted with some caution. Changes in instrument type, station network size, station exposure, and choice of metric used mean that interpreting trends in storminess from UK wind speed data is not straightforward due to the limitations of available data.

Local Climate

Precipitation - Rainfall

13.4.5. Average seasonal rainfall at Stockton-on-Tees weather station, England East and North East, and the UK - for the period 1991–2020 - is presented in **Table 13-2**. It shows that the weather station is drier than both the region and the UK average year round, particularly during winter.

Table 13-2 - Long term average seasonal rainfall (mm) (1991–2020) for Stockton on Tees weather station, England East and North East, and the rest of the UK

Season	Stockton on Tees Weather Station	England East and North East	UK
Summer (June, July, August)	178 mm	208.5 mm	253.4 mm
Winter (January. February, December)	128.5 mm	205.4 mm	344.9 mm

Precipitation - Snow

13.4.10. Snowfall is closely linked with temperature, with falls rarely occurring if the temperature is higher than 4°C. In the local area, snowfall is normally confined to the months including and between November to April.

Temperature

13.4.11. **Table 13-3** shows the long-term average seasonal mean temperature for Stockton-on-Tees weather station, England East and North East, and the UK

between 1991-2020. It shows that the Site is warmer than both the region and UK average.

Table 13-3 - Long term average mean seasonal temperature (oC) (1991–2020 for Stockton on Tees weather station, England East and North East, and the rest of the UK

Season	Stockton on Tees Weather Station	England East and North East	UK
Summer (June, July, August)	15 °C	14.9 °C	14.6 °C
Winter (January. February, December)	4.2 °C	3.9 °C	4.1 °C

Wind

13.4.12. The local area is one of the more sheltered parts of the UK. In general, the strongest winds are associated with the passage of deep depressions across or close to the UK. The frequency and strength of these depressions is greatest in the winter half of the year, especially from December to February, and this is when mean speeds and gusts (short duration peak values) are strongest.

Humidity

13.4.13. The annual average relative humidity for the Site is 78-80%, with a slightly higher humidity of 80-82% in the surrounding area.

Solar Radiation

13.4.14. Average seasonal sunshine hours at Stockton-on-Tees Weather station, England East and North East, and the UK for the period 1991–2020 is presented in **Table 13-4**. The table shows that the weather station receives slightly less sunshine than the region, but greater than the UK average.

Table 13-4 - Long term average seasonal sunshine (hours) (1991–2020) for Stockton on Tees weather station, England East and North East, and the rest of the UK

Season	Stockton on Tees Weather Station	England East and North East	UK
Summer (June, July, August)	507	534	507
Winter (January. February, December)	183	189	162

Sea Level Rise

13.4.15. The Site is located along the tidal River Tees, flowing into the nearby North Sea. Large portions of the site are within Flood Zone 2 and 3 associated with River Tees.

Past Major Events

13.4.16. In December 2013, Port Clearance was subject to severe tidal flooding. A high spring tide was forecast; the tide at Teesport was due to peak at 1704 hrs. At a height of 2.85m AOD (Above Ordnance Datum). The meteorological conditions on that day included strong offshore wind, with a deep area of low pressure forming in the North Sea causing the positive surge on top of the already high tide, The positive surge measured 1.24m above the spring tide, giving a total tide height of 4.09m AOD, which exceeded previous historical event. This event resulted in extensive damage and disruptions with internal flooding to residential properties, 20 businesses in Port Clarence, Billingham Reach Industrial Estate and Seal Sands in addition to severe transport disruption on major highways and evacuation of residents. The Environment Agency mobilised immediately and engaged the military, as there was no access to the breach due to the wide spread flooding (**Ref 13.15**).

13.4.17. In February to March 2018, there was the most significant spell of snow and low temperatures for the UK overall since December 2010. The snow and ice resulted in road closures, people becoming stranded, trains and flights cancelled, school closures, and power cuts (**Ref 13.16**). The spell also led to many instances of broken heating or frozen pipes, which led to buildings flooding (**Ref 13.17**).

13.4.18. In February 2022, Storm Eunice led to wind speeds reaching over 50mph in the area of the Proposed Scheme (**Ref 13.18**), causing road closures, flooding, and over 100 Teesside homes were without power (**Ref 13.19**).

13.4.19. In July 2022, the UK experienced a brief but unprecedented extreme heatwave from 16 to 19 July 2022, as hot air moved north from the near continent, with extreme temperatures recorded on both 18 and 19 July. This heatwave marked a milestone in UK climate history, with 40°C being recorded for the first time in the UK, with a large part of England exceeding 37°C. There were several fatalities associated with open water swimming. Several fire services declared major incidents after multiple fires broke out. The UK Health Security Agency (UKHSA) published analysis of deaths during heat-periods in 2022 and which suggests that the 5-heat periods in the summer of 2022 resulted in a total of 2,803 excess deaths (excl. COVID-19) in people aged 65 and over across England as a whole (**Ref 13.20**).

13.4.20. December 2022 saw a week of cold temperatures and snow. The 12 December was the coldest day in the UK since December 2010, according to provisional

data from the Met Office. A Level 3 Cold Weather Alert was issued from 9-16 December by the UKHSA, with concerns for serious health consequence, particularly for the elderly and those with heart or lung conditions. The prolonged spell of low temperatures resulted in ice forming on many inland lakes and waterways. Widespread snow and icy conditions made difficult driving conditions (**Ref. 13.21**).

FUTURE BASELINE

13.4.21. The UKCP18 (**Ref 13.22**) probabilistic projections for RCP8.52,3 (high emission scenarios) have been used to infer future changes in a range of climate variables that may affect the vulnerability of the Proposed Scheme to climate change. The Climate Risk Indicators (CRI) (**Ref 13.23**), developed as part of the UK Climate Resilience Programme has been used to infer this assessment (**Ref 13.24**). 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). The CRI data for the local authority of Stockton-on-Tees local authority has been used to inform this assessment.

13.4.22. The future climate has been presented for the 2030s (2020-2049), the 2050s (2040-2069) and 2080s (2070-2099) to identify the anticipated climate conditions. These projections are provided against the baseline period of 1981-2010 (based on model data), and 1991-2020 (current climate) as an indication of change from the baseline period.

13.4.23. Although the assessment has been undertaken for the 50th percentile (i.e. the median, or central estimate) the 10th and the 90th percentiles are presented here to illustrate the full range of projected outcomes.

13.4.24. Climate change is projected to lead to warmer wetter winters and hotter drier summers, with an increase in the intensity and frequency of extreme events such as heatwaves, drought, extreme rainfall leading to flash flooding, storms and wind events. The information presented below illustrates how the climate may evolve at the site of the Proposed Scheme by the end of the century.

Precipitation – Rainfall and Temperature

13.4.25. **Table 13-5** provides an overview of current and projected summer and winter temperature and rainfall for the location of the Proposed Scheme.

[2] Representative Concentration Pathways (RCPs) specify concentrations of greenhouse gases that will result in total radiative forcing increasing by a target amount by 2100, relative to pre-industrial levels. Radiative forcing targets for 2100 have been set at 2.6, 4.5, 6.0 and 8.5 W m-2 named RCP2.6, RCP4.5, RCP6.0 and RCP8.5, respectively.
[3] RCP8.5 (high emission scenarios) is used to ensure a suitable conservative approach in line with IEMA guidance

Table 13-5 - Temperature and rainfall data for the Model Reference (1981-2010), current (1991-2020) and future climate (2030s, 2050s and 2080s) for RCP8.5 (anomalies), the table shows the 50th percentile (10th percentile to 90th percentile) values

Climate Variable	Model Reference (1981-2010)	Current Baseline (1991-2020)	RCP8.5		
			2030	2050	2080
Average summer temperature	14.7ºC	15ºC	+1.0ºC (0.3ºC – 1.7ºC)	+1.9ºC (0.8ºC – 3.2ºC)	+3.9ºC (1.8ºC – 6.1ºC)
Average winter temperature	3.9ºC	4.2ºC	+0.9ºC (0.1ºC – 1.8 ºC)	+1.6ºC (0.6ºC – 2.8ºC)	+3.0ºC (1.3ºC – 4.8ºC)
Min winter temperature	0.8ºC	1.1ºC	+0.9ºC (0ºC – 1.9ºC)	+1.6ºC (0.4ºC – 2.9ºC)	+3.0ºC (1.0ºC – 5.2ºC)
Max summer temperature	19.4ºC	19.7ºC	+1.0ºC (0.2ºC – 1.9ºC)	+2.0ºC (0.5ºC – 3.6ºC)	+4.0ºC (1.4ºC – 6.7ºC)
Average summer Rainfall	166 mm	178 mm	-5.9% (-18.9% - +8.2%)	-13.7% (-30.4% - +4.6%)	-23.1% (-42.2% - -1.8%)
Average winter rainfall	122 mm	128.5mm	+6.9% (-0.9% - +14.9%)	+11.6% (+1.3% to +22.2%)	+20.9% (+6.3% - +35.7%)

13.4.29. Indicators of climate risk are shown in **Table 13-6**. These provide an indication of sector specific thresholds which are projected to change in the future. The indicators presented in **Table 13-6** are provided against the model reference period of 1981-2010. These indicators are unavailable for the current baseline period (1991-2020).

Table 13-6 - Future projections (absolute) of climate risk indicators for the 2030s, 2050s and 2080s for RCP8.5, the table shows the 50th percentile (10th percentile to 90th percentile) values

Climate Variable	Model reference (1981-2010)	RCP8.5		
Met office heatwave[4] (events per year)	0.7	1.5 (1.0 – 2.2)	2.5 (1.3 – 4.1)	4.5 (2.5 – 6.1)
Road accident risk[5] (days per year)	46.4	34.0 (26.3 – 42.9)	26.8 (18.4 – 37.6)	16.9 (8.81 – 29.5)
Road melt risk (days per year)[6]	6.4	12.3 (8.7 – 17.4)	20.0 (10.7 – 35.3)	43.0 (19.7 – 72.9)
Heat stress[7] (days per year)	0	0.07 (0.01 – 0.14)	0.23 (0.03 – 1.50)	3.02 (0.30 – 10.93)
Wildfire events[8] (days per year)	21.7	30.3 (20.7 – 43.5)	40.3 (23.8 – 61.8)	60.1 (30.5 – 90.7)

Precipitation - Snow

13.4.30. 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 (25km) of UKCP18, however both the regional (12km) and the local (2.2km) of UKCP18 show a decrease in both falling and lying snow across the UK for the period of 2061-2080 relative to the 1981-2000 baseline.

Humidity

13.4.31. Projections for humidity anticipate an average decrease of approximately 1.1% in the 2030s (-2.1% to -0.7%), and a decrease of 2% in the 2050s (-2.9% to –1.5%).

Soil Moisture

13.4.32. **Table 13-7** indicates the projected changes in soil moisture, with a decrease in soil moisture for the 50th percentile, and a slight increase under the 90th percentile.

[4] A UK heatwave threshold is met when a location records a period of at least three consecutive days with daily maximum temperatures meeting or exceeding the heatwave temperature threshold. The threshold for the local area is 25 °C.
[5] Days with minimum temperature below 0°C
[6] Days with maximum temperature above 25 °C
[7] Days with shade Wet Bulb Globe Temperature (WBGT) above 25°C
[8] Days with Met Office Wildfire Index at the Very High Fire Severity level or above

Table 13-7 - Future projections of soil moisture (as % change) for the 2030s, 2050s and 2080s for RCP8.5, the table shows the 50th percentile (10th percentile to 90th percentile) values

	2030s	2050s	2080s
Soil Moisture[9] (% change)	-1.2% (-5.7% - +0.8%)	-1.8% (-8.3% - +0.4%)	-2.7% (-11.7% - + 0.6%)

Wind

13.4.33. UKCP18 depicts a wide spread of future changes in mean surface wind speed, however, there is large 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.

13.4.34. Central estimates of change in mean wind speed for the 2050s are small in all ensembles runs (<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%.

13.4.35. In terms of storms, the analysis presented here is a summary of expected changes in storm patterns under a changing climate. A storm is defined by the Met Office as a wind event measuring 10 or higher on the Beaufort scale (equivalent to a wind speed of 27m/s or 60mph) (**Ref 13.25**).

13.4.36. Studies (**Ref 13.26**) relating to future projections of storms suggest that climate driven storm changes are less distinct in the northern than southern hemisphere. However, such is the wide range of inter-model variation, robust projections of changes in storm track are not yet possible and there is low confidence in the direction of future changes in the frequency, duration or intensity of storms affecting the UK.

Sea Level Rise and Flood Risk

13.4.37. The Site is located along the tidal River Tees, flowing into the nearby North Sea. Therefore, it is at risk of future sea level rise. Sea level projections at the closest marine projections data point, adjacent east of the Proposed Scheme, range from 0.12m in the 2030s to 0.74m in the 2080s. **Table 13-8** below depicts the projected sea level rise for the 2030s, 2050s and 2080s using UKCP18 marine projections data.

[9] Potential soil moisture deficit measured by the maximum difference between accumulated rainfall and potential evaporation.

Table 13-8 - Sea level rise projections (m) presented as 50th percentile (10th percentile to 90th percentile) for the Development area

2030s	2050s	2080s
0.16 (0.12 to 0.21)	0.29 (0.22 to 0.38)	0.55 (0.40 to 0.74)

13.4.38. According to the EA flood risk summary (**Ref 13.27**) for the site, the Proposed Scheme is currently at high risk from tidal and fluvial flooding (greater than 3.3% chance of flooding per year), with other areas at low risk (between 0.1% and 1% chance of flooding per year), as shown below.

Figure 13-1 - Extent of flooding from rivers or the sea at the Proposed Scheme (Ref 13.27)

13.5. SENSITIVE RECEPTORS

13.5.1. In the case of climate resilience, the sensitive receptors considered within the EIA are described below.

CONSTRUCTION PHASE

13.5.2. The construction period is likely to be up to four years in duration, (commencing no earlier than April 2024). The sensitive receptors during construction phase include:

- Construction site and laydown;

- Construction materials;
- Construction workers; and
- Plant and equipment (such as vehicles, cranes and high structures and ancillary features such as fencing, drainage, freshwater supply and lighting).

13.5.3. The sensitive receptors for the construction phase are vulnerable to changes in climate variables as explained in **Section 13.7**.

OPERATION PHASE

13.5.4. The operational lifespan of the project is estimated to be 30 years, with 15-18 months for decommissioning either prior to or at 30 years. The sensitive receptors during the operation phase include:

- Sustainable Aviation Fuel (SAF) Plant and components (including Gasification, Syngas Compression and Clean-up, Fischer-Tropsch (FT) Synthesis, Auxillary POx, Carbon Capture Unit, Thermal Oxidiser, Miscellaneous Tankage, Sub-stations (1,2 and 3) & ancillary equipment, Power Plant, Air separation Unit, Feedstock Silos, Upgrading, Wastewater treatment Plant (WWTP), General Administration Facilities and Process waste storage);
- Feedstock Processing and Storage area;
- Bulk Liquid Storage (for SAF and naphtha);
- Pipeline and cable connections (import and export) and Utility corridors;
- Flares;
- Hard landscaping (including pavement, parking, temporary and permanent laydown areas)
- Internal Conveying Corridors (above ground);
- Rail Terminal;
- Drainage (including cover ponds);
- Marine transport infrastructure; and
- Operational Staff.

13.5.5. The sensitive receptors for the operation phase are vulnerable to changes in climate variables as explained in **Table 13-12** of **Section 13.7**.

13.6. DESIGN, MITIGATION AND ENHANCMENT MEASURES

CONSTRUCTION PHASE

13.6.1. A Code of Construction Practice (CoCP) will be developed as the design progresses. It is likely the CoCP will consider measures to reduce the risk of weather and climate impacts during the construction phase. Measures will be developed for inclusion in the CoCP at the ES stage and may include those

identified below to support in the preparation and response to weather and climate change impacts during the construction phase:

- Provide adequate rest, shade, welfare facilities 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.
- Excavations and openings to be barriered off appropriately and in accordance with current health and safety guidance/regulations.
- Small materials to be kept in locked storage containers, larger materials kept logically and neatly within site compounds and covered if possible. This would be detailed within a Site Waste Management Plan, forming part of the CoCP;
- An Emergency Response Plan would be produced as part of the CoCP, the following measures may be included:
    - Procedures for dealing with fire hazards in place;
    - Emergency response plans in place for accidents and emergency personnel identified;
    - The Contractor will monitor daily weather forecasts and identify if an extreme weather event is likely to occur on the site;
    - In the event of a forecast of a severe storm, gale, tidal surge or extreme temperature:
        - The Site management will inform all site supervisors and managers of the likely event and instruct them to assess what the possible effects are on the site in terms of safety, environmental effects, damage to plant, equipment or structures; and
        - Once this is complete, any protective measures will be put in place to safeguard against the effects of the potential event. This may include but not be limited to the following: Removal of plant from low lying areas, securing doors and lowering of jibs etc; Moving marine plant to safe areas or jacking up to a height above the risk zone; Removing/securing any items likely to be blown/washed away (scaffold boards, materials, tools, equipment); Inspecting any temporary flood walls to ensure they are adequate. If not, carry out remedial action; Secure or protect exposed services; and Ensure site is secured and locked down once the shift is finished.
- Dust-generating activities (e.g. cutting, grinding and sawing) to be minimised and weather conditions considered prior to conducting potentially dust-emitting activities;
- Fine material will not be stockpiled to an excessive height in order to prevent exposure to wind and dust nuisance;

- Sand and other aggregates will be stored in bunded areas and not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- Stockpiles will be covered to prevent wind whipping;
- Roads and accesses to be kept clean;
- Drop heights from excavators to crushing plant to be kept to a minimum. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate;
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods;
- For earthworks and exposed areas/soils: Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable; Where appropriate, use reinforced soils in embankments to accommodate for changes in precipitation, runoff and soil stability; and the Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable;
- Material will not be burnt on Site;
- Engines to be switched off when not in operation;
- Increasing the frequency of site inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions;
- A temporary surface water drainage strategy to be prepared for the construction stage to ensure that surface run-off would not directly enter existing watercourses and temporary drainage arrangements to be constructed ahead of the construction works commencing to ensure that surface runoff will not directly enter existing watercourses;
- Measures to be put in place to prevent pollution from construction plant, vehicles and machinery including refuelling and lubricating in designated areas, on an impermeable surface, with appropriate cut-off drainage located away from watercourses; and
- A flood management plan in place including the safety of staff during flood events, the storage of construction material away from flood prone locations on site and checklists of procedures for staff during a flood.

OPERATION PHASE

13.6.2. At the time of writing this chapter the committed design, mitigation and enhancement measures proposed which support the resilience of the scheme to climate change impacts include:

- Proposed Scheme maintenance would include routine, planned maintenance and system checks as well as reactive maintenance and repairs.

Feedstock Processing and Storage Area

- Maintenance schedule will be in operation such that the storage facility will allow the LGF plant to build up suitable buffer capacity to maintain operations while the Materials Recycling Facility (MRF) facilities are shut down for maintenance, and vice versa; and
- The storage bunkers will be covered for inclement weather protection, or alternatively, constructed within a dedicated building.

Pipeline and Cable Connections and Utility Corridors

- The conveyor corridors are likely to be above ground and covered where appropriate to protect transported materials from weather and external elements.

Rail Terminal

- The existing rail terminal located in the southwest of the Site is operated by Navigator, the Applicant continues to liaise with Network Rail in relation to protective provisions and likely works required.

Drainage

- A Flood Risk Assessment (FRA) will be undertaken as the Site is within Flood level 2 and 3 zones, the assessment will consider an appropriate climate change allowance in line with NPPF and NPPG.

DECOMMISSIONING PHASE

13.6.3. A Decommissioning Plan would be prepared. The Plan will consider the climate change risk mitigating measures as identified within the CoCP, where appropriate.

13.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

13.7.1. The IEMA Guidance (**Ref 13.11**) outlines that the scoping stage should identify the key climatic variables relevant to the Proposed Scheme and likely effects; however, it is not prescriptive in how this is undertaken.

13.7.2. Furthermore, climate change in-combination with other environmental effects of the Proposed Scheme includes the potential for climate change to exacerbate or ameliorate the potential effects identified within each of the environmental topics. The in-combination climate impacts will be assessed as part of the ES as part of the in-scope environmental factors.

IDENTIFYING VULNERABLE PROPOSED SCHEME ELEMENTS

13.7.3. The future baseline presented in **Section 13.4** has been analysed to provide an understanding of the climate trends that have the potential to affect the Project.

The climate variables have been assessed for the time periods across the Project lifetime.

13.7.4. The vulnerability assessment is the outcome of an assessment of sensitivity and exposure of the receptors identified in **Section 13.5** to the climate trends presented in **Section 13.4**. The vulnerability assessment has been undertaken for all phases of the Proposed Scheme in order to identify the impacts with a likely significant effect.

13.7.5. The exposure and sensitivity of the receptor to climate impacts is assigned a level of vulnerability as shown in the matrix in **Table 13-9**.

Table 13-9 - Vulnerability Matrix

Sensitivity	**Exposure**		
	Low	**Medium**	**High**
Low	Low vulnerability	Low vulnerability	Low vulnerability
Moderate	Low vulnerability	Medium vulnerability	Medium vulnerability
High	Low vulnerability	Medium vulnerability	High vulnerability

13.7.8. Sensitivity refers to the degree of response of the receptor to a change and its capacity to accommodate and recover from a change should it be effected. 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, moderate or low. Such that 'high sensitivity' implies that the receptor will lose much of its original form and function, 'moderate sensitivity' implies that the receptor is able to tolerate some climatic conditions without being fully altered though remains susceptible to be altered to some extent and that 'low sensitivity' implies that projected changes in the climatic factors have little influence on the receptor; and

13.7.9. Exposure is the nature and degree to which climate variations may pose a risk to the Project. 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. The construction phase is assessed as exposure to the climate trends of the '2030s' (2020-2049), the operational phase considers the climate trends for the 2050s (2040-2069) and

2080s (2070-2099)10 and the decommissioning phase considers the climate trends for the 2080s (2070-2099),On completion of the vulnerability assessment, climate variables in the construction, operation and decommissioning phase to which the Proposed Scheme is likely to have a low vulnerability to are scoped out of further assessment (**Ref 13.11**) as no potential for likely significant effects is identified. Climate variables in the construction, operation and decommissioning phase to which the Proposed Scheme is likely to have a medium or high vulnerability to are taken forward for further assessment at the next stage as these variables are identified as having the potential for likely significant effects. This is a qualitative assessment informed by expert opinion and supporting literature.

Construction Phase

13.7.10. **Table 13-10** presents the assessment of vulnerability the Proposed Scheme during the construction phase. This takes into account the exposure (based on current and future baseline conditions, as defined in **Section 13.4**) and sensitivity taking into account any design, mitigation and enhancement measures addressed in **Section 13.6**.

13.7.11. The results of the vulnerability assessment presented in **Table 13-11** show that Low vulnerability has been identified for all climate variables. As stated above in **paragraph 13.7.6**, variables with a Low vulnerability are not anticipated to result in any likely significant effects. Therefore, no likely significant effects are identified in the construction phase.

[10] Although the design life is 30-year period, the climate trends for operation and decommissioning phases are considered up to the 2080s (2070-2099) to account for 'worst-case' scenario contingency planning enabling a more rapid and efficient response to climate change risk events.

Table 13-10 - Vulnerability assessment for the Construction Phase

Receptor	Climate Variable	Associated Hazard	Exposure	Sensitivity	Vulnerability
Construction site, laydown and materials storage and handling	Precipitation	Change in annual average	Medium	Low	Low
		Drought	Medium	Low	Low
		Extreme precipitation events (flooding)	High	Low	Low
	Temperature	Change in annual average	Medium	Low	Low
		Extreme temperature events	Medium	Low	Low
	Wind	Gales and high winds	High	Low	Low
		Storms and lightning	High	Low	Low
	Relative humidity	Changes in annual average	Low	Low	Low
	Sea level rise	Sea level rise	Medium	Low	Low
Construction workers	Precipitation	Change in annual average	Medium	Low	Low
		Drought	Medium	Low	Low
		Extreme precipitation events (flooding)	High	Low	Low

Receptor	Climate Variable	Associated Hazard	Exposure	Sensitivity	Vulnerability
	Temperature	Change in annual average	Medium	Low	Low
		Extreme temperature events	Medium	Low	Low
	Wind	Gales and high winds	High	Low	Low
		Storms and lightning	High	Low	Low
	Relative humidity	Changes in annual average	Medium	Low	Low
	Sea level rise	Sea level rise	Medium	Low	Low
Construction plant and equipment	Precipitation	Change in annual average	Medium	Low	Low
		Drought	Medium	Low	Low
		Extreme precipitation events (flooding)	Medium	Low	Low
	Temperature	Change in annual average	Medium	Low	Low
		Extreme temperature events	High	Low	Low
	Wind	Gales and high winds	High	Low	Low
		Storms and lightning	High	Low	Low

Receptor	Climate Variable	Associated Hazard	Exposure	Sensitivity	Vulnerability
	Relative humidity	Changes in annual average	Medium	Low	Low
	Sea level rise	Sea level rise	Medium	Low	Low

Operation Phase

13.7.12. **Table 13-11** presents the assessment of vulnerability the Proposed Scheme during operation phase. This takes into account the exposure (based on current and future baseline conditions, as defined in **Section 13.4**) and sensitivity taking into account any design, mitigation and enhancement measures addressed in **Section 13.6**. Variable identified as having a medium or high vulnerability (as per **paragraph 13.7.6**) are identified as having potential likely significant effects. These effects are outlined in **Table 13-12**.

Table 13-11 - Vulnerability assessment for the Operation Phase

Receptor	Variable	Associated Hazard	Exposure	Sensitivity	Vulnerability
SAF Plant and components	Precipitation	Change in annual average	Low	Low	Low
		Drought	Medium	High	Medium
		Extreme precipitation events (flooding)	High	Moderate	Medium
	Temperature	Change in annual average	Medium	Low	Low
		Extreme temperature events	High	Moderate	Medium
	Wind	Gales and high winds	High	High	High
		Storms and lightning	High	High	High
	Relative humidity	Changes in annual average	Medium	Moderate	Medium
	Sea level rise	Sea level rise	High	High	High
Feedstock Processing and Storage area	Precipitation	Change in annual average	Low	Low	Low
		Drought	Medium	Low	Low
		Extreme precipitation events (flooding)	High	Moderate	Medium

Receptor	Variable	Associated Hazard	Exposure	Sensitivity	Vulnerability
	Temperature	Change in annual average	Medium	Low	Low
		Extreme temperature events	High	Moderate	Medium
	Wind	Gales and high winds	High	Moderate	Medium
		Storms and lightning	High	Moderate	Medium
	Relative humidity	Changes in annual average	Medium	Moderate	Medium
	Sea level rise	Sea level rise	High	High	High
Bulk Liquid Storage	Precipitation	Change in annual average	Low	Low	Low
		Drought	Medium	Moderate	Medium
		Extreme precipitation events (flooding)	High	High	High
	Temperature	Change in annual average	Medium	Moderate	Medium
		Extreme temperature events	High	High	High
	Wind	Gales and high winds	High	Moderate	Medium
		Storms and lightning	High	Moderate	Medium

Receptor	Variable	Associated Hazard	Exposure	Sensitivity	Vulnerability
	Relative humidity	Changes in annual average	Medium	Moderate	Medium
	Sea level rise	Sea level rise	High	High	High
Pipeline and cable connections (import and export) and Utility corridors	Precipitation	Change in annual average	Low	Low	Low
		Drought	Medium	Low	Low
		Extreme precipitation events (flooding)	High	Moderate	Medium
	Temperature	Change in annual average	Medium	Low	Low
		Extreme temperature events	High	Moderate	Medium
	Wind	Gales and high winds	High	Moderate	Medium
		Storms and lightning	High	Moderate	Medium
	Relative humidity	Changes in annual average	Medium	Moderate	Medium
	Sea level rise	Sea level rise	High	High	High
Flares	Precipitation	Change in annual average	Low	Low	Low
		Drought	Medium	Low	Low

Receptor	Variable	Associated Hazard	Exposure	Sensitivity	Vulnerability
		Extreme precipitation events (flooding)	High	Moderate	Medium
	Temperature	Change in annual average	Medium	Low	Low
		Extreme temperature events	High	High	High
	Wind	Gales and high winds	High	Moderate	Medium
		Storms and lightning	High	High	High
	Relative humidity	Changes in annual average	Medium	Moderate	Medium
	Sea level rise	Sea level rise	High	High	High
Hard landscaping (including pavement, parking, temporary and permanent laydown areas);	Precipitation	Change in annual average	Low	Low	Low
		Drought	Medium	Moderate	Medium
		Extreme precipitation events (flooding)	High	High	High
	Temperature	Change in annual average	Medium	Moderate	Medium
		Extreme temperature events	High	High	High

Receptor	Variable	Associated Hazard	Exposure	Sensitivity	Vulnerability
	Wind	Gales and high winds	High	Moderate	Medium
		Storms and lightning	High	Moderate	Medium
	Relative humidity	Changes in annual average	Medium	Low	Low
	Sea level rise	Sea level rise	High	High	High
Internal Conveyor Corridor	Precipitation	Change in annual average	Low	Low	Low
		Drought	Medium	Low	Low
		Extreme precipitation events (flooding)	High	Moderate	Medium
	Temperature	Change in annual average	Medium	Low	Low
		Extreme temperature events	High	Moderate	Medium
	Wind	Gales and high winds	High	Low	Low
		Storms and lightning	High	Low	Low
	Relative humidity	Changes in annual average	Medium	Low	Low
	Sea level rise	Sea level rise	High	High	Medium

Receptor	Variable	Associated Hazard	Exposure	Sensitivity	Vulnerability
Rail Terminal	Precipitation	Change in annual average	Low	Low	Low
		Drought	Medium	Moderate	Medium
		Extreme precipitation events (flooding)	High	High	High
	Temperature	Change in annual average	Medium	Moderate	Medium
		Extreme temperature events	High	High	High
	Wind	Gales and high winds	High	Low	Low
		Storms and lightning	High	Low	Low
	Relative humidity	Changes in annual average	Medium	Low	Low
	Sea level rise	Sea level rise	High	High	High
Drainage	Precipitation	Change in annual average	Low	Low	Low
		Drought	Medium	Low	Low
		Extreme precipitation events (flooding)	High	High	High

Receptor	Variable	Associated Hazard	Exposure	Sensitivity	Vulnerability
	Temperature	Change in annual average	Medium	Low	Low
		Extreme temperature events	High	Low	Low
	Wind	Gales and high winds	High	Moderate	Medium
		Storms and lightning	High	Moderate	Medium
	Relative humidity	Changes in annual average	Medium	Low	Low
	Sea level rise	Sea level rise	High	High	High
Marine Transport Infrastructure	Precipitation	Change in annual average	Low	Low	Low
		Drought	Medium	High	Medium
		Extreme precipitation events (flooding)	High	Moderate	Medium
	Temperature	Change in annual average	Medium	Low	Low
		Extreme temperature events	High	Moderate	Medium
	Wind	Gales and high winds	High	High	High
		Storms and lightning	High	High	High

Receptor	Variable	Associated Hazard	Exposure	Sensitivity	Vulnerability
	Relative humidity	Changes in annual average	Medium	Moderate	Medium
	Sea level rise	Sea level rise	High	High	High
Operational Staff	Precipitation	Change in annual average	Low	Low	Low
		Drought	Medium	Low	Low
		Extreme precipitation events (flooding)	High	Moderate	Medium
	Temperature	Change in annual average	Medium	Low	Low
		Extreme temperature events	High	High	High
	Wind	Gales and high winds	High	High	High
		Storms and lightning	High	Moderate	Medium
	Relative humidity	Changes in annual average	Medium	Low	Low
	Sea level rise	Sea level rise	High	High	High

13.7.13. The likely significant effects associated with the operation phase are shown in **Table 13-12**. Receptors associated with the associated hazards are identified and potential impacts detailed in accordance with professional judgement and experience on past projects of similar magnitude and purpose.

Table 13-12 - Likely Significant Effects – Operation Phase

Climate Variable	Associated Hazard	Receptor(s) Affected	Potential Impacts
Precipitation Sea level rise	Extreme rainfall events Changes in annual average rainfall Snow/ice Sea level rise Storm surge	▪ SAF plant and components; ▪ Feedstock Processing and Storage area; ▪ Bulk liquid Storage; ▪ Pipeline and cable connections (import and export) and Utility corridors; ▪ Hard landscaping (including pavement, parking, temporary and permanent laydown areas); ▪ Internal conveyor corridor; ▪ Rail terminal; ▪ Drainage ▪ Marine infrastructure; and ▪ Operational staff.	▪ Reduction in earthwork stability and hastening the deterioration of materials; ▪ Mobilisation of pollutants potentially affecting building materials and consequently the structural integrity; ▪ Flooding of all assets resulting in loss or disruption of function and associated risks; ▪ Deterioration of material structure and fabric; ▪ Drainage infrastructure overwhelmed leading to surface water flooding; ▪ Power outages and disruption to business continuity; ▪ Damage to above ground infrastructure due to snow and ice; and ▪ Safety risks to operational staff.
	Drought	▪ SAF Plant and components; ▪ Feedstock processing and storage areas; ▪ Pipeline and cable connections (import and export) and Utility corridors;	▪ Drying out and cracking of materials which has the potential to affect structural and foundation stability; ▪ Cracking of surfaces (during dry spells); and ▪ Low river flows, affecting the water that is available for cooling, marine infrastructure and has the potential to lead to subsidence.

Climate Variable	Associated Hazard	Receptor(s) Affected	Potential Impacts
		▪ Bulk liquid storage; ▪ Parking and roads; ▪ Flares; and ▪ Marine Infrastructure	
Temperature	Extreme temperature events (heatwaves and cold spells) Changes in annual average temperatures	▪ SAF plant and components; ▪ Feedstock Processing and Storage area; ▪ Bulk liquid Storage; ▪ Pipeline and cable connections (import and export) and Utility corridors; ▪ Hard landscaping (including pavement, parking, temporary and permanent laydown areas); ▪ Internal conveyor corridor; ▪ Rail terminal; ▪ Drainage ▪ Marine infrastructure; and ▪ Operational staff.	▪ It is anticipated that over time faults in machinery and equipment may occur (due to design life of equipment), extreme temperature events have the potential to exacerbate the occurrence of these faults;; ▪ Overheating of infrastructure, leading to greater demand for cooling; ▪ Overheating of electronic equipment resulting in potential fire risks; ▪ Increased pressure on thermal oxidiser; ▪ Increase risk of fire and associated safety risks; ▪ Faster deterioration of materials from UV radiation (e.g. fading and brittleness); ▪ Safety risks to solvent and for the storage of hydrogen within the Hydrogen Project; ▪ Deterioration of material structure and fabric; ▪ Damage to paved surfaces; ▪ Expansion and contraction of tracks and conveyor corridor; ▪ Potential melting and deformation of materials; ▪ Increased temperature of cooling water and of river flows that are used for cooling, thereby reducing efficiency of this process;

Climate Variable	Associated Hazard	Receptor(s) Affected	Potential Impacts
			▪ Security infrastructure and lighting may fail in heatwave conditions; and ▪ Safety risks to operational staff.
Wind	Extreme wind / Gales and Storms (lightning)	▪ SAF plant and components; ▪ Feedstock Processing and Storage area; ▪ Bulk liquid Storage; ▪ Pipeline and cable connections (import and export) and Utility corridors; ▪ Hard landscaping (including pavement, parking, temporary and permanent laydown areas); ▪ Internal conveyor corridor; ▪ Rail terminal; ▪ Drainage; ▪ Marine infrastructure; and ▪ Operational staff.	▪ Potential impact to stability of above-ground infrastructure; ▪ Material degradation; ▪ Damage from wind-driven rain infiltration into building materials and surfaces; ▪ Windborne dust and debris clogging drainage systems and requiring clearing; ▪ Increase maintenance costs and operational disruption; ▪ Power loss; ▪ Lightning strike can cause fire as well as power surges and shock waves which can destabilise energy systems, as well as cause damage to electronical equipment; ▪ Marine infrastructure may be unsafe to operate in high wind speeds; and ▪ Potential safety risk should structure become weakened
Relative Humidity	Change in annual average	▪ SAF plant and components; ▪ Feedstock Processing and Storage area; ▪ Bulk liquid Storage; ▪ Pipeline and cable connections (import and export) and Utility corridors;	▪ Humidity affects both the performance of the plant and storage areas as well as the comfort of staff. ▪ Increase condensation, mould growth, mildew, staining and the corrosion and decay of metal surfaces; and ▪ Poor insulation performance.

Climate Variable	Associated Hazard	Receptor(s) Affected	Potential Impacts
		▪ Hard landscaping (including pavement, parking, temporary and permanent laydown areas); ▪ Internal conveyor corridor; ▪ Rail terminal; ▪ Marine infrastructure; and ▪ Operational staff.	

Decommissioning Phase

13.7.14. **Table 13-13** presents the assessment of vulnerability the Proposed Scheme during the decommissioning phase. This takes into account the exposure (based on the future baseline conditions, as defined in **Section 13.4**) and sensitivity taking into account any design, mitigation and enhancement measures addressed in **Section 13.6**.

13.7.15. As with the construction phase, the results of the vulnerability assessment presented below show that Low vulnerability has been identified for all climate variables. As stated above in **paragraph 13.7.6**, variables with a Low vulnerability are to be scoped out of further assessment as there is no potential for these to result in likely significant effects.

Table 13-13 - Vulnerability assessment for the Decommissioning Phase

Receptor	Variable	Associated Hazard	Exposure	Sensitivity	Vulnerability
Decommissioning site, laydown and materials storage and handling	Precipitation	Change in annual average	Low	Low	Low
		Drought	Medium	Low	Low
		Extreme precipitation events (flooding)	High	Low	Low
	Temperature	Change in annual average	Medium	Low	Low
		Extreme temperature events	High	Low	Low
	Wind	Gales and high winds	High	Low	Low
		Storms and lightning	High	Low	Low
	Relative humidity	Changes in annual average	Medium	Low	Low
	Sea level rise	Sea level rise	High	Low	Low
Site workers	Precipitation	Change in annual average	Low	Low	Low
		Drought	Medium	Low	Low
		Extreme precipitation events (flooding)	High	Low	Low

Receptor	Variable	Associated Hazard	Exposure	Sensitivity	Vulnerability
	Temperature	Change in annual average	Medium	Low	Low
		Extreme temperature events	High	Low	Low
	Wind	Gales and high winds	High	Low	Low
		Storms and lightning	High	Low	Low
	Relative humidity	Changes in annual average	Medium	Low	Low
	Sea level rise	Sea level rise	High	Low	Low
Decommissioning plant and equipment	Precipitation	Change in annual average	Low	Low	Low
		Drought	Medium	Low	Low
		Extreme precipitation events (flooding)	High	Low	Low
	Temperature	Change in annual average	Medium	Low	Low
		Extreme temperature events	High	Low	Low
	Wind	Gales and high winds	High	Low	Low
		Storms and lightning	High	Low	Low

Receptor	Variable	Associated Hazard	Exposure	Sensitivity	Vulnerability
	Relative humidity	Changes in annual average	Medium	Low	Low
	Sea level rise	Sea level rise	High	Low	Low

ELEMENTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

13.7.16. Following the establishment of likely significant effects (**Table 13-10**) and the vulnerability assessment (**Table 13-8**, **Table 13-9** and **Table 13-13**), the receptors deemed low vulnerability have been scoped out of further assessment. The receptors deemed medium or high vulnerability have been scoped in for further assessment in the ES. Further details on this are summarised in **Table 13-14**.

Table 13-14 - Elements Scoped in or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Construction site and laydown; Construction materials; Construction workers; and Plant and equipment. All climate variables.	Construction		✔	Determined as low vulnerability (see **Table 13-10**). Therefore, likely significant effects are not anticipated. The relatively short construction phase, in the context of climate trends, combined with the management of weather related risks in the CoCP, will result in no potential for significant effects being identified.
Decommissioning site and laydown; materials; workers; and Plant and equipment. All climate variables.	Decommissioning		✔	Determined as low vulnerability (see **Table 13-13**). Therefore, likely significant effects are not anticipated. Decommissioning is anticipated to last 15-18 months either prior to or at 30 years (the operational lifespan of the project). It is considered that the potential effects of decommissioning of the Proposed Scheme would be similar to those of the construction phase. The measures adopted from the CoCP with regards to climate change impacts (**Paragraph 13.6.1**) would be considered within the Decommissioning Plan.
SAF plant and components. Climate Variables: Changes in annual average precipitation, Change in annual average temperature.	Operation		✔	Determined as low vulnerability (see **Table 13-11**). Therefore, likely significant effects are not anticipated (see **Table 13-11**). The SAF plant and components is less likely to be impacted by changes in annual average temperature and rainfall events.
SAF plant and components. Climate Variables:	Operation	✔		Determined as medium to high vulnerability (see **Table 13-11**). Therefore, likely significant effects are anticipated (see **Table 13-12**).

Element	Phase	Scoped In	Scoped Out	Justification
Extreme precipitation events, Drought, Extreme temperature events, Wind, Relative Humidity, Sea level rise				The SAF plant and components is vulnerable to flooding (pluvial, fluvial and coastal) due to location along the River Tees. Additionally, the SAF plant has the potential to be vulnerable to extreme temperature, relative humidity and wind storm events. With medium to high levels of exposure and moderate to high levels of sensitivity.
Feedstock Processing and Storage area. Pipeline and cable connections (import and export) and Utility corridors. Flares Climate Variables: Changes in annual average precipitation, Drought, Change in annual average temperature	Operation		✔	Determined as low vulnerability (see **Table 13-11**). Therefore, likely significant effects are not anticipated. The receptors components are less likely to be impacted by changes in annual average temperature and rainfall events and drought.
Feedstock Processing and Storage area Pipeline and cable connections (import and export) and Utility corridors Flares Climate Variables:	Operation	✔		Determined as medium to high vulnerability (see **Table 13-11**). Therefore, likely significant effects are anticipated (see **Table 13-12**). The receptors are vulnerable to flooding (pluvial, fluvial and coastal) due to location along the River Tees. In addition, these receptors are likely to be sensitive to extreme temperature, relative humidity and wind storm events.

Element	Phase	Scoped In	Scoped Out	Justification
Extreme precipitation events, Extreme temperature events, Wind, Relative Humidity, Sea level rise				
Bulk Liquid Storage Climate Variables: Changes in annual average precipitation.	Operation		✔	Determined as low vulnerability (**Table 13-11**). Therefore, likely significant effects are not anticipated. The Bulk Liquid Storage is less likely to be impacted by changes in annual average rainfall and is determined as low vulnerability as a low level exposure rating has been applied.
Bulk Liquid Storage Climate Variables: Drought, Extreme precipitation events (pluvial flooding), Change in annual average temperature, Extreme temperature events, Wind events, Relative humidity, Sea level rise.	Operation	✔		Determined as medium to high vulnerability (see **Table 13-11**). Therefore, likely significant effects are anticipated (see **Table 13-12**). The Bulk Liquid storage is vulnerable to flooding (pluvial, fluvial and coastal) due to location along the River Tees. In addition, the storage is likely to be sensitive to changes in annual temperatures, extreme temperature, drought, relative humidity and wind storm events. With medium to high levels of exposure and moderate to high levels of sensitivity.
Hard landscaping (including pavement, parking, temporary and permanent laydown areas). Climate Variables: Change in annual average precipitation, Relative Humidity.	Operation		✔	Determined as low vulnerability (see **Table 13-11**). Therefore, likely significant effects are not anticipated. Roads, walkways, pavements and laydown areas are less likely to be sensitive to changes in annual average rainfall and relative humidity.

Element	Phase	Scoped In	Scoped Out	Justification
Hard landscaping (including pavement, parking, temporary and permanent laydown areas). Climate Variables: Extreme precipitation events, Drought, Changes in annual average temperature, Extreme temperature events, Wind, and Sea level rise.	Operation	✔		Determined as medium to high vulnerability (see **Table 13-11).** Therefore, likely significant effects are anticipated (see **Table 13-12**). Roads, walkways, pavements and laydown areas are vulnerable to drought, change in annual average temperatures and wind events and highly vulnerable to flooding (pluvial, fluvial and coastal) due to location along the River Tees and extreme temperature events. With medium to high levels of exposure and moderate to high levels of sensitivity.
Internal Conveyor Corridor Climate Variables: Change in annual average precipitation, Drought, Change in annual average temperature, Wind, Relative humidity.	Operation		✔	Determined as low vulnerability (see **Table 13-11**). Therefore, likely significant effects are not anticipated. The Internal Conveyor Corridor is less likely to be sensitive to changes in annual average rainfall and temperature, drought, wind and relative humidity
Internal Conveyor Corridor Climate Variables: Extreme precipitation events, Extreme temperature events and Sea level rise.	Operation	✔		Determined as medium to high vulnerability (see **Table 13-11).** Therefore, likely significant effects are anticipated (see **Table 13-12**). The Internal Conveyor Corridor is vulnerable to drought, change in annual average temperatures and wind events and highly vulnerable to flooding (pluvial, fluvial and coastal) due to location along the River Tees and extreme temperature events. With medium to high levels of exposure and moderate to high levels of sensitivity.

Element	Phase	Scoped In	Scoped Out	Justification
Rail Terminal Climate Variables: Changes in annual average precipitation, Wind, Relative humidity.	Operation		✔	Determined as low vulnerability (see **Table 13-11**). Therefore, likely significant effects are not anticipated. The rail terminal is less likely to be impacted by changes in annual average rainfall and relative humidity.
Rail Terminal Climate Variables: Drought, Extreme precipitation events, Temperature, Sea level rise.	Operation	✔		Determined as medium to high vulnerability (see **Table 13-11**). Therefore, likely significant effects are anticipated (see **Table 13-12**). The rail terminal is vulnerable to drought, change in annual average temperatures and wind events and highly vulnerable to flooding (pluvial, fluvial and coastal) due to location along the River Tees and extreme temperature events. With medium to high levels of exposure and moderate to high levels of sensitivity.
Drainage Climate variables: Change in annual average precipitation, drought, Temperature, Relative humidity.	Operation		✔	Determined as low vulnerability (see **Table 13-11**). Therefore, likely significant effects are not anticipated. Drainage is unlikely to be impacted by changes in annual average rainfall, drought, temperature events and relative humidity.
Drainage Climate variables: Extreme precipitation events (pluvial flooding), Wind, Sea level rise.	Operation	✔		Determined as medium to high vulnerability (see **Table 13-11**). Therefore, likely significant effects are anticipated (see **Table 13-12**). Although a FRA will be undertaken for the Proposed Scheme. However, the results of the FRA are at present

Element	Phase	Scoped In	Scoped Out	Justification
				unknown, as such, the drainage is vulnerable to extreme rainfall, sea level rise and wind events. The results from FRA will be taken into consideration at ES stage.
Marine transport infrastructure Climate Variables: Changes in annual average precipitation, Change in annual average temperature.	Operation		✔	Determined as low vulnerability (see **Table 13-11**). Therefore, likely significant effects are not anticipated. The Marine transport infrastructure is less likely to be impacted by changes in annual average rainfall and temperature
Marine transport infrastructure Climate Variables: Drought, Extreme precipitation events, Extreme temperature events, Wind, Relative Humidity, Sea level rise.	Operation	✔		Determined as medium to high vulnerability (see **Table 13-11**). Therefore, likely significant effects are anticipated (see **Table 13-12**). The Marine transport infrastructure is vulnerable to drought, extreme rainfall events, extreme temperature events, wind and storms, relative humidity and sea level rise. With medium to high levels of exposure and moderate to high levels of sensitivity.
Operational Staff Climate Variables: Changes in annual average precipitation, Drought, Change in annual average temperature, and Relative humidity.	Operation		✔	Determined as low vulnerability (see **Table 13-11**). Therefore, likely significant effects are not anticipated. Operational staff are less likely to be impacted by changes in annual average rainfall and temperature, drought and relative humidity.

Element	Phase	Scoped In	Scoped Out	Justification
Operational Staff Climate Variables: Extreme precipitation events, Extreme temperature events, Wind and Sea level rise.	Operation	✔		Determined as medium to high vulnerability (see **Table 13-11).** Therefore, likely significant effects are anticipated (see **Table 13-12**). Operational staff are vulnerable to extreme climate events such as extreme rainfall, extreme temperature events, wind and storm events and sea level rise. With medium to high levels of exposure and moderate to high levels of sensitivity.
In-combination Climate Change Impacts (ICCI).	Operation	✔		The receptors for the ICCI assessment are receptors within the surrounding environment that would be impacted by the Proposed Scheme in combination with future climatic conditions. The baseline for an ICCI assessment is based on how identified receptors in the surrounding environment are affected by future climate parameters. The climate parameters relevant to the Proposed Scheme are extreme weather events, temperature and precipitation. An ICCI has been scoped in, this will be captured within the relevant chapters as part of the assessments for other environmental topics.

13.8. PROPOSED ASSESSMENT METHODOLOGY

13.8.1. The assessment of impacts will be undertaken using an approach based on the IEMA guidance (**Ref 13.11**), and professional judgement.

13.8.2. 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 and **Table 13-15** and **Table 13-16**. These descriptions have been developed using professional judgement, informed by relevant guidance. It should be noted that the IEMA guidance (**Ref 13.11**) definitions of consequence has been developed for large scale infrastructure specifically, and therefore, the description of the measure of consequence will have regard to the wider Proposed Scheme.

13.8.3. 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 13-15 - Consequences Definitions

Measure of consequence	Description
Very large adverse	Permanent damage. Disruption lasting more than ten days. Early renewal of facility / infrastructure >90%. Severe health effects and / or fatalities. Repairs cost 50% of facility reconstruction cost.
Large adverse	Extensive facility / infrastructure damage. Disruption lasting more than three but less than ten days. Early renewal of 50-90% of infrastructure Severe health effects and / or fatalities. Significant effect on the environment, requiring remediation. Repairs cost 50% of facility reconstruction cost.
Moderate adverse	Limited facility / infrastructure damage with damage recoverable by maintenance or minor repair. Disruption lasting more than one but less than three days. Adverse effects on health and / or the environment. Repairs cost 25% of facility reconstruction cost.
Minor adverse	Localised facility / infrastructure disruption. No permanent damage, minor restoration work required: Facility closure lasting less than one day. Slight adverse health or environmental effects. Repairs cost 2% of facility reconstruction cost.
Negligible	No facility / infrastructure damage, minimal adverse effects on health, safety and the environment. Facility doesn't shut down. No financial loss.

Table 13-16 - 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

13.8.8. The likelihood and consequence are combined to assess the significance of effects on receptors, as shown in **Table 13-17**. The assessment is qualitative and based on professional judgment, engagement with the design team and a review of relevant literature.

Table 13-17 - Significance Rating Matrix

Likelihood	Consequence of Hazard Occurring				
Very High	**Negligible**	**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

Likelihood	Consequence of Hazard Occurring				
Very Low	Not significant	Not significant	Not significant	Not significant	Not significant

13.9. LIMITATIONS AND ASSUMPTIONS

13.9.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- The in-combination climate impacts will be assessed at ES stage by each individual topic discipline with support from climate risk specialists.
- The UKCP18 projections have been used to infer future changes in a range of climate variables that may affect the vulnerability of the Proposed Scheme to climate change. At the time of writing, these represent the most up-to-date representation of future climate in the UK. The CRI have been developed using UKCP18 projections.
- There are inherited limitations and uncertainties within the CRI data. Further information on the methodology used to produce this data can be found **Ref 13.23**.
- 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 resilience 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.

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14. MATERIAL ASSETS AND WASTE

14.1. INTRODUCTION

14.1.1. This chapter considers the impacts of the Proposed Scheme on the consumption of material assets, and generation and disposal of waste. It considers impacts during construction, operation and decommissioning, and any potential significant adverse environmental effects. It sets out the proposed methodology for the material assets and waste assessment and identifies those impacts that can be scoped out of the assessment. Where impacts are scoped in, further assessment will be presented in the ES.

14.2. POLICY, LEGISLATION AND GUIDANCE

14.2.1. The policy, legislation, and guidance relevant to the Material Assets and Waste assessment of the Proposed Scheme is as follows:

Table 14-1 – Materials and Waste – Summary of key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
National Planning Policy Framework (2021) (NPPF) (**Ref. 14.1**)	The NPPF 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."
National Planning Policy for Waste (2014) (**Ref. 14.2**)	The National Planning Policy for Waste 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.
National Policy Statement for Hazardous Waste (2013) (**Ref. 14.3**)	The National Policy Statement for Hazardous Waste outlines the Government's main objectives for hazardous waste and the key principles for management of hazardous waste.
Overarching NPS for Energy EN-1 2011 (**Ref 14.4**)	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.

Policy / Legislation / Guidance	Description
	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 (NPS) for Energy (EN-1) 2023 (**Ref 14.5**)	Paragraph 3.3.38 makes reference to energy from waste where by the principal purpose is the reduce the amount of waste going to landfill in accordance with the Waste Hierarchy. Section 5.15: Resource and Waste Management, outlines the government expectations on hazardous and non-hazardous waste, which are intended to protect human health and the environment by producing less waste and by using it as a resource wherever possible. Applicants should ensure that through construction best practices, material is reused or recycled on site where possible, or sourced from recycled or reused sources, and that low carbon materials, sustainable sources and local suppliers are used.
Waste Management Plan for England (2021) (**Ref. 14.6**)	The Waste Management Plan for England provides a detailed analysis of the present state of waste management at the national level, and assesses how the objectives of the Waste Framework Directive will be effectively supported. It outlines the Waste Hierarchy, which gives top priority to waste prevention, followed by preparing for reuse, recycling, other types of recovery and finally disposal (e.g. landfill).
Our Waste, Our Resources: A Strategy for England (2018) (**Ref. 14.7**)	Our Waste, Our Resources: A Strategy for England sets out how the Government will preserve stock of 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.
Tees Valley Joint Minerals and waste Development Plan (2011)	The Tees Valley Minerals and Waste Development Plan Documents have been prepared jointly by the boroughs of Darlington, Hartlepool, Middlesbrough, Redcar and Cleveland and Stockton-on-Tees. The Core Strategy Development Plan Document (DPD) (**Ref 14.8**) and Policies and Sites DPD (**Ref 14.9**) set out the vision and strategic polices required to achieve the key objectives for minerals and waste in the Tees Valley. The development plan aims are for the Tees Valley, by 2026, to give priority to the production of secondary and recycled aggregates for construction; limit and carefully manage primary aggregate extraction and safeguard mineral resources; and promote the reuse, recycling and recovery of value from waste.
Legislation	

Policy / Legislation / Guidance	Description
The Environment Act 2021 (**Ref 14.10**)	The Act sets out clear statutory targets for the recovery 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.
Waste (Circular Economy) (Amendment) Regulations 2020 (**Ref 14.11**)	These regulations amend The Waste (England and Wales) Regulations 2011 and The Environmental Permitting (England and Wales) Regulations 2016 to include prevention of waste generation and establishing waste prevention programmes, greater segregation of waste and more detailed records.
The Environmental Permitting (England and Wales) Regulations 2016 (as amended) (**Ref 14.12**)	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 (**Ref 14.13**)	The Controlled Waste (England and Wales) Regulations 2012 provide a definition of controlled waste and classifies waste as household, industrial or commercial waste. It allows Local Authorities to implement charges for the collection of waste from non-domestic properties.
The Waste (England and Wales) Regulations 2011 (**Ref 14.14**)	These regulations allow for the transfer of controlled waste to be recorded on alternative documentation, such as invoices, instead of waste transfer notes.
The Revised EU Waste Framework Directive 2008/98/EC (2008) (**Ref 14.15**)	The Directive provides a comprehensive foundation for the management of waste across the European Community and provides a common definition of waste. A definition of waste is provided in the predecessor to this Directive (European Directive 2006/12/EC) which defines waste as: “any substance or object that the holder discards, or intends or is required to discard.”
The Clean Neighbourhoods and Environment Act 2005 (**Ref 14.16)**	The Act provides that it is the responsibility of construction workers on site to guarantee that waste is disposed in the appropriate manner.
The Hazardous Waste (England and Wales) Regulations 2005 (**Ref 14.17**)	These regulations introduced 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.
Council Directive 1999/31/EC of 26 April 1999 on the Landfill of Waste (1999) (**Ref 14.18**) ‘The Landfill Directive’	The Landfill Directive aims to protect both human health and the environment. In particular, it provides measures, procedures and guidance to reduce as much as possible negative impact from landfill. In particular to surface water, groundwater, soil, air; on the global environment including greenhouse effect; and risks to human health. The Directive introduces rigorous operational and technical requirements. The provisions of these Directives continue to have effect as transposed into domestic law by virtue of The Waste and

Policy / Legislation / Guidance	Description
	Environmental Permitting etc. (Legislative Functions and Amendment etc) (EU Exit) Regulations 2020. These regulations make provisions and amendments to the Environmental Protection Act 1990 and waste regulations to ensure that environmental permitting and waste regimes continued to operate effectively following the EU exit transition period.
The Waste Minimisation Act 1998 (**Ref 14.19**)	The Act enabled 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 14.20**)	The Act defines, within England and Wales and Scotland, 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 as a result of construction activities are recovered or disposed of without any subsequent adverse effects upon the surrounding environment.
The Control of Pollution (Amendment) Act 1989 (**Ref 14.21**)	The Control of Pollution (Amendment) Act 1989 makes it a criminal offence for a person who is not a registered carrier to transport controlled waste to or from any place in Great Britain. The Act also provides for the seizure and disposal of vehicles used for illegal waste disposal.
The Control of Pollution Act 1974 (**Ref 14.22**)	The Act makes provisions with respect to the generation and revision of 'waste disposal plans' and prohibits the unlicensed disposal of waste.
Guidance	
IEMA Guide to Materials and Waste in Environmental Impact Assessment (2020) (**Ref 14.23**) ('the IEMA Guidance')	Guidance used to assess the potential impacts and effects from the Proposed Scheme, using the process and significance criteria it sets out.

14.3. STUDY AREA

14.3.1. The study areas that are applicable to the Proposed Scheme (as defined in the IEMA Guidance (**Ref 14.23**), are:

- The **Development Study Area** - the extent of works within the Site, including areas required for temporary access, site compounds and other enabling activities.
- The **Expansive Study Area** extends to the availability of construction materials and the capacity of waste management facilities within the UK and the regions where the Proposed Scheme is located; the North East of England region (Durham, Northumberland, Tees Valley Unitary Authorities and Tyne and Wear).

14.4. BASELINE CONDITIONS AND FUTURE BASELINE

14.4.1. This chapter describes baseline material consumption and waste disposal for the current land use and provides regional and national information and data in the context of which environmental assessment can be undertaken.

14.4.2. The most up to date sources of information have been used to collate data for material resource availability, landfill capacity and waste recovery. Indication of the most recent year from which data has been acquired is provided throughout. The baseline data collected and presented in this section were obtained by desk study, from publicly available data sources.

BASELINE

14.4.3. The key sources of information on material resource availability, landfill capacity and waste recovery will be:

- Department for Business and Trade (2023) Monthly Statistics of Building Materials and Components (**Ref 14.24**).
- North East England Aggregates Working Party Annual Report 2020 (2021) (**Ref 14.25**).
- Mineral Products Association (2022) 'Aggregates demand and supply in Great Britain: Scenarios for 2035' (**Ref 14.26**).
- Mineral Products Association, Profile of the UK Mineral Products Industry, 2020 Edition (**Ref 14.27**).
- StatsWales. (2023). Iron and Steel Production by Year, Measure and Area (**Ref 14.28**).
- Defra (2022) UK Statistics on Waste (**Ref 14.29**).
- Environment Agency, Waste Data Interrogator (2023) Waste Management Information 2021 (**Ref 14.30**).
- Environment Agency (2023). 2021 Remaining landfill capacity, England (**Ref 14.31**).

Materials Currently Required

14.4.4. The Development Study Area comprises an area of land incorporating infrastructure previously commissioned for a former energy generation facility; the plot is not operational and therefore does not currently consume any naturally or other occurring material resources. Other areas within the Development Study Area include an existing operational materials from waste facility, hydrogen storage facility, jetties and rail and road infrastructure. These areas are not under ownership or operational duty of the Applicant. Materials required for the operation of the active infrastructure is anticipated to comprise resources for routine maintenance and repair. This is expected to include small volumes of steel or other metals, or asphalt for upkeep of roadways. Feedstock for the existing materials from waste facility comprises non-

hazardous waste products, and therefore does not consume materials resulting in the depletion of natural resources. Although no data is currently available, professional judgement can be used to assert that by comparison with regional and national availability of resources, consumption of construction and other materials for routine activities currently required within the current land uses, is minimal.

Materials Availability

14.4.5. **Table 14-2** provides a summary of the availability of the main construction materials in North East of England region and the UK. The items listed are considered to be appropriate to the bulk construction materials required for the Proposed Scheme. The overview provided excludes technological products but provides a proportionate context in which the assessment of impacts and significant effects from material consumption from the Proposed Scheme can be undertaken.

Table 14-2 - Construction materials availability in the North East of England and the UK

Material Type	North East England	UK
Sand and gravel * (**Ref. 14.24**)	2.2 million tonnes (Mt) (2022)	53.3 million tonnes (Mt) (GB) (2022)
Permitted crushed rock *	4.9 Mt (2020) (**Ref. 14.25**)	125.9 Mt (GB) (2021) (**Ref. 14.26**)
Primary aggregate (comprises sand and gravel and crushed rock) *	6.5 Mt (2022) (**Ref. 14.25**)	183.3 (GB) (2021) (**Ref. 14.26**)
Concrete blocks + (**Ref. 14.24**)	29.4 million square meters (Mm^2) (North) (2022)	72.8 Mm^2 (2022)
Recycled and secondary aggregate *	0.8 Mt (2022) (**Ref. 14.25**)	71.0 Mt (2018) (GB) (**Ref. 14.27**)
Ready-mix concrete * (**Ref. 14.27**)	0.6 million cubic meters (Mm^3) (2019)	24.7 Mm^3 (2019)
Steel + (**Ref. 14.28**)	(no data)	7.2 Mt (2021)
Asphalt * (**Ref. 14.27**)	0.8Mt (2019)	27.4 Mt (2019)

stocks + production * sales

GB: Great Britain (England, Wales and Scotland) figures used where UK figures (including Northern Ireland) are unavailable

14.4.9. Across the UK, the availability of materials typically required for construction schemes, indicates that stocks / production / sales remain buoyant, although information on steel stocks, production or sales are not available for the region.

14.4.10. The North East England Aggregates Working Party Annual Monitoring Report 2020 (**Ref 14.25**) indicates that the landbank of permitted reserves for sand and gravel is 12.6 years and for crushed rock is 35.1 years (as of 31 December 2020).

14.4.11. The Tees Valley Core Strategy (**Ref. 14.8**) includes plans for Mineral Safeguarding Areas. Whilst the Strategy indicates there are no shallow reserves of coal, sand and gravel, limestone, there are deep reserves of gypsum and salt located within and adjacent the Development Study Area. However, it is also noted that these reserves are already sterilised by the existing infrastructure.

Site arisings currently generated

14.4.12. The Development Study Area comprises infrastructure commissioned for a former energy generation facility which is not operational; the assets on this part of the site do not, therefore, generate any site arisings. The existing operational infrastructure within the Development Study Area (materials from waste facility, hydrogen storage facility, jetties and rail and roads, as described in **Chapter 2: Site and Proposed Scheme Description**) may generate site arisings, waste which can be diverted from landfill, or hazardous waste which can be treated. The materials from waste facility operates under an environmental permit owned by N + P Group (number EPR/SP3305PX) allowing the annual treatment of up to 300,000 tonnes of non-hazardous waste to generate refuse derived fuels and solid recovered fuels. The permit requires the facility to apply the Waste Hierarchy. Although no data is currently available, professional judgement can be used to assert that generation of site arisings is minimal.

Regional perspective: Transfer, recovery and recycling

14.4.13. The charts and data presented in this section confirm the availability of waste management facilities in the region; these facilities are expected to enable suitable recovery of site arisings generated by the Proposed Scheme. Data suggests that there is strong potential to divert any site arisings from landfill.

14.4.14. Defra data (shown in **Table 14-3**) (**Ref 14.29**) show that within England, the recovery rate for non-hazardous construction and demolition wastes has remained above 90% since 2015.

Table 14-3 - Non-Hazardous Construction and Demolition Waste Recovery in England

Year	Generation (Mt)	Recovery (Mt)	Recovery rate (%)
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%

Year	Generation (Mt)	Recovery (Mt)	Recovery rate (%)
Note: Defra's 2022 update of the data in this table did not extend the data range for England beyond 2020			

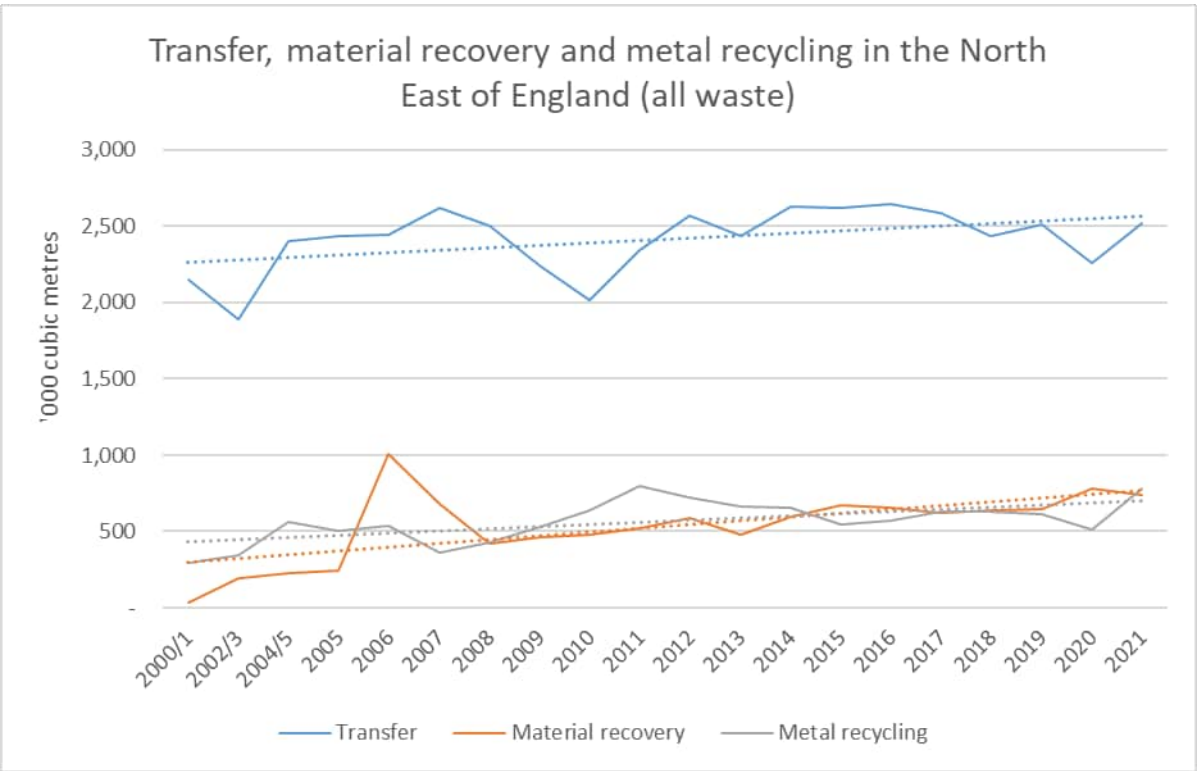
14.4.15. Regional data for construction and demolition waste (**Table 14-4**) show that the North East Region's recovery percentage is lower than the average across England, as demonstrated in **Table 14-3**. Data include the total waste received from both within North East England and from other regions in the UK (**Ref 14.30**).

Table 14-4 - Waste management routes for waste received in North East England (2021)

Waste management route	Inert and non-hazardous waste (tonnes)	Hazardous waste (tonnes)	Total waste (tonnes)	Percentage
Recovery	2,335,704	74,178	2,409,882	57%
Landfill	1,821,334	19,919	1,841,252	43%
Other fate	3,028	-	3,028	0%
Totals	4,160,065	94,097	4,254,162	100%

14.4.16. Data in **Figure 14-1** has been collated to show that trends for waste recovery in the region have risen steadily over the past 21 years (**Ref 14.30**). Data is provided for all waste types in North East England and hence will include, but are not specific to, construction, demolition and excavation wastes.

Figure 14-1 - Transfer, materials recovery and metal recycling in North East England (2000/1 – 2021)



14.4.17. Trends for transfer, recovery and metal recycling in North East England indicate that there is likely to be regional infrastructure and capacity for managing construction, demolition and excavation wastes from the Proposed Scheme. Construction and demolition recovery trends across North East England (**Figure 14-1**) and the data in **Table 14-5** confirm this assertion (**Ref 14.30**).

Table 14-5 - Permitted waste recovery sites in North East England (2021)

Waste recovery facility type	Number of sites
Incineration	15
Transfer	161
Treatment	151
Metal recovery	121
Use of waste	1
Total	**449**

14.4.18. The Tees Valley Joint Minerals and Waste Development Plan Policies and Sites (**Ref 14.9**) considers construction and demolition waste recycling and encourages the promotion of facilities able to manage site arisings close to their source. Policy MWC7 (**Ref 14.8**) allows for land to be provided to increase construction and demolition waste recycling from 700,000 tonnes per annum (tpa) in 2016 to 791,000 tpa in 2021.

Waste Currently Generated and Disposed

14.4.19. The Development Study Area comprises infrastructure developed for a former energy generation facility which is not operational, and does not currently generate any waste for disposal to landfill. The existing operational infrastructure within this plot (materials from waste facility, hydrogen storage facility, jetties and rail and roads) may generate some waste for disposal at landfill. Given that the materials from waste facility and the hydrogen storage facility both operate under environmental permits (under third party ownership), it is anticipated that waste management procedures will be in place to apply the Waste Hierarchy and minimise the volume of waste for disposal to landfill. The jetties, rail and road infrastructure may generate some waste for disposal to landfill, such as litter, packaging or waste from maintenance and repair works. The magnitude of impact associated with disposing of this waste is expected – using professional judgement – to be negligible in the context of available regional capacity.

Remaining Landfill Capacity

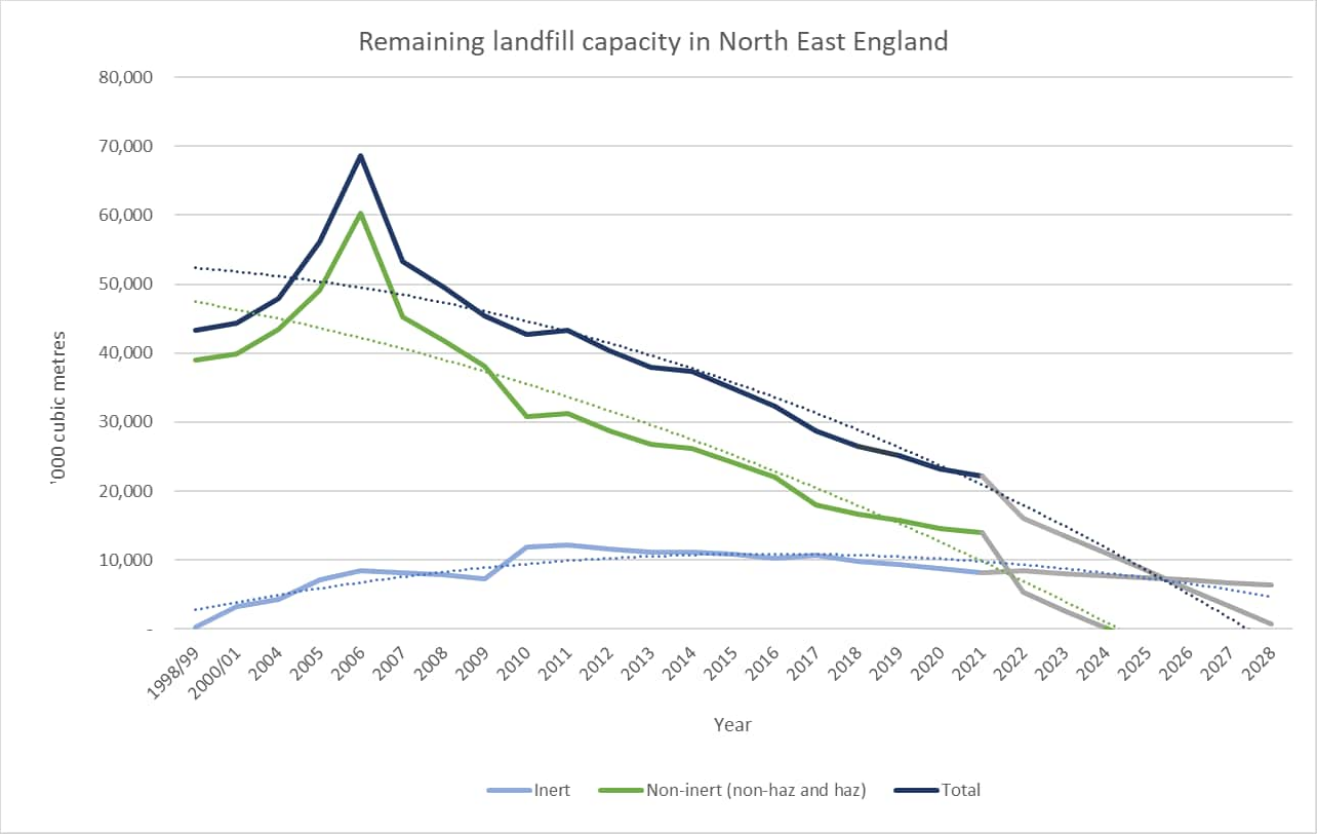
14.4.20. The most recent Environment Agency data (**Ref 14.31**) confirm that at the end of 2021, 19 landfill sites in North East England were recorded as having 22 million cubic meters (Mm^3) of remaining capacity; this data is presented in **Table 14-6**, which also shows the change in capacity from 2020 to 2021.

Table 14-6 - Remaining landfill capacity in North East England (2020-2021)

Landfill type	Capacity in 2020 (m^3)	Remaining capacity m^3 (2021)	2020 to 2021 capacity comparison (Million m^3)
Hazardous (merchant)	4,643,903	4,486,359	-0.2 (-3.4%)
Inert	8,681,586	8,170,173	-0.5 (-5.9%)
Non-hazardous (including stable hazardous waste cells)	9,867,677	9,445,125	-0.4 (-4.3%)
Total	**23,193,166**	**22,101,657**	**-1.1 (-4.7%)**
Notes	Restricted hazardous landfill sites are excluded as they only accept waste from restricted sources and producers, e.g. site operator / managing site.		

14.4.21. Baseline regional landfill capacity is detailed in **Figure 14-2**. Simple statistical forecasting (using the Microsoft Excel forecasting function) has been used to demonstrate long term void capacity in the confirmed absence of future provision. Currently the construction phase (including enabling and ground preparation works) is assumed to commence in 2024, with completion anticipated in 2027 or 2028. For the purposes of forecasting remaining landfill capacity, the year 2028 has been used.

Figure 14-2 - Remaining landfill capacity in North East England



14.4.22. 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 14-2** shows that in the absence of future provision, waste capacity in North East England is forecast to reduce from 2021 to 2028 by as much as:

- Inert waste: 22% to 6.4 Mm^3;
- Non-inert waste: 100% to 0 Mm^3 (remaining capacity is forecast to elapse in 2025); and
- Total waste: 97% to 0.7 Mm^3.

14.4.23. To align with the IEMA Guidance (**Ref 14.23**) assessment classifications, remaining hazardous landfill capacity is assessed at a national level (rather than regionally). The following data in **Table 14-7** confirms that at the end of 2021, England had 12.1 Mm^3 of remaining capacity for hazardous (merchant) waste.

Table 14-7 - Remaining Landfill Capacity in England (2021)

Landfill type	Remaining capacity in 2021 (m^3)
Hazardous merchant	12,106,518
Hazardous restricted*	2,105,291
Total hazardous	14,211,809

*Restricted landfill sites only accept waste from restricted sources and producers, e.g. site operator / managing site.

FUTURE BASELINE

14.4.24. In a future baseline, and in the absence of the Proposed Scheme, it is considered that the land use within the Development Study Area will remain in its current state as a vacant site. The existing operational infrastructure operated by third parties (materials from waste facility, hydrogen storage facility, jetties and rail and roads) are anticipated to remain (where they are not subject to change by the Proposed Scheme). Whilst there may be occasional requirement to manage any potential damage or dilapidation of the existing infrastructure, it is anticipated that any material consumption or waste generation for disposal to landfill would be minimal.

14.5. SENSITIVE RECEPTORS

14.5.1. In the context of this assessment, the following sensitive receptors have been identified:

- Material resources – consumption impacts on materials' immediate and long-term availability, and results in depletion of natural resources.
- Landfill void capacity – reductions in regional and national infrastructure result in unsustainable use and loss of resources, and temporary or permanent degradation of the natural environment.

14.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

14.6.1. It is anticipated that the principles of circular practice and sustainable resource management (including designing out waste) - in the context of the Waste Hierarchy and the Proximity Principle - will be applied and adopted through – as a minimum – the outline Code of Construction Practice (CoCP) submitted as part of the ES. No other primary mitigations for materials and / or waste, for the construction and operation phases of the Proposed Scheme, have yet been committed to, but it is expected that measures will be identified and adopted as the design develops.

14.6.2. Examples of design (secondary) mitigation and enhancement measures are noted in **Table 14-8**, although none of these are yet formally committed to by the client.

Table 14-8 - Potential design, mitigation and enhancement measures

Element	Description	Stage
Materials	Identification and specification of material resources that can be acquired responsibly, in accordance with BES 6001 Responsible Sourcing of Construction Products (**Ref 14.32**)	Design and construction
	Design for resource optimisation: simplifying layout and form, using standard sizes, balancing cut and fill, maximising the use of renewable materials, and materials with recycled or secondary content, and setting net importation as a scheme goal.	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 repurposing, reuse, and remanufacturing, as well as deconstructability and demountability of installed elements, can be maximised at end-of-first-life.	Design
	Design to incorporate products that can be leased or hired (Products as a Service), or digitalise elements of the works (in place of physical structures and assets).	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
	Implement a Materials Management Plan in accordance with the CL:AIRE Definition of Waste: Code of Practice (**Ref 14.33**).	Construction
Waste	Engage early with contractors to identify possible enhancement and mitigation measures (for example, waste exemption licenses), 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 schemes.	Design
	Ensure arisings are properly characterised before or during design, to maximise the potential for highest value reuse.	Design
	Forecast and identify the volume and type of woodland and other vegetative arisings that will be generated, and establish opportunities for high-value reuse and recycling, both on and off-site.	Design and construction

Element	Description	Stage
	Working to a proximity principle, ensuring arisings generated are handled, stored, managed and reused or recycled as close as possible to the point of origin.	Design and construction
	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, by developing a Site Waste Management Plan once a preferred option has been selected.	Design

14.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

14.7.1. During the construction phase, natural materials will be required, which could have a potentially significant adverse effect on the environment through the depletion of natural resources. The types and quantities of construction materials will be assessed as part of the ES.

14.7.2. Waste will be generated during construction phase, which has the potential for significance adverse effects on remaining landfill capacity. Landfill capacity is considered a sensitive receptor in the UK. The potential for waste to be diverted from landfill through reuse of site arisings and recovery, recycling or treatment of waste will reduce the adverse effects on landfill capacity. The types and quantities of waste generated and the anticipated disposal method will be assessed as part of the Environmental Statement.

OPERATION PHASE

14.7.3. During operation, it is anticipated that natural material resource consumption will be limited, and only required for maintenance or repair works. Using professional judgement, it is considered that the quantities of materials required will be negligible and therefore will not result in significant adverse effects.

14.7.4. The feedstock for the Proposed Scheme (derived from domestic and commercial waste) is not a naturally occurring material and therefore will not impact on the depletion of material resources and is therefore not within the scope of this assessment.

14.7.5. Waste generated by the operation of the Proposed Scheme is anticipated to be managed accordance with the Waste Hierarchy to maximise diversion from landfill where possible. Some operational waste may be disposed of to landfill, such as ash, tramp, slag, if alternative waste recovery routes cannot be found. In lieu of an

assessment of operational waste, the development of an Outline Waste Management Plan (WMP) will be prepared to accompany the ES.

14.7.6. The domestic and commercial waste derived feedstock used for the Proposed Scheme is not waste generated by the Proposed Scheme and is therefore not within the scope of this assessment.

ELEMENTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

14.7.7. The elements scoped in and out for further assessment are summarised in **Table 14-9**.

Table 14-9 - Elements Scoped in or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Consumption of material resources associated with the construction of the Proposed Scheme	Construction (site preparation)	✔		Further information is required to assess the potential impacts of the Proposed Scheme construction on regional material resource availability, in the context of the recovery and reuse of site won materials and the consumption of recycled / secondary resources. These materials are a finite resource and, in the absence of comprehensive data for the entire site and based on the scale and nature of the Proposed Scheme, this element should be scoped into the ES for further assessment, but could be subject to scoping out following liaison with stakeholders.
Consumption of material resources associated with the Proposed Scheme during operation	Operation		✔	Operation phase activities of the Proposed Scheme are not anticipated to require consumption of material resources beyond those necessary for routine repair and maintenance. As such, the impacts associated with material resource consumption are considered to be minimal and not significant. This is therefore scoped out and does not require further assessment in the ES.
Disposal and recovery of waste associated with	Construction (including site preparation)	✔		Further information is required to assess the potential impacts of the Proposed Scheme on existing waste

Element	Phase	Scoped In	Scoped Out	Justification
the construction and of the Proposed Scheme				infrastructure and landfill capacity. Assessment will reconfirm remaining landfill capacity and identify on-site storage, potential disposal / treatment / reuse of all waste types (e.g. inert, non-hazardous and hazardous) and required mitigation measures. No significant demolition activities (for example existing buildings or road infrastructure) are anticipated as part of the construction phase for the Prosed Scheme. It is noted that demolition activities will occur and assessed under a separate TCPA consent.
Disposal and recovery of waste associated with the Proposed Scheme during operation	Operation		✔	The operation of the Proposed Scheme is anticipated to generate waste arisings. An Outline WMP will be prepared as part of the ES submission in lieu of scoping in operational waste. The Outline WMP will (where applicable) review relevant policies and procedures and solid waste generation information, with a view to formalising the management arrangements for operational solid waste arising from the Proposed Scheme.
Consumption of material resources associated with the Proposed Scheme decommissioning	Decommissioning		✔	The design life of the Proposed Scheme is anticipated to be 30 years. Material resources are not anticipated to be required for decommissioning the works. As such, the effects associated with material resource consumption are considered to be minimal and not significant
Disposal and recovery of waste associated with the Proposed Scheme decommissioning	Decommissioning		✔	The design life of the Proposed Scheme is anticipated to be 30 years. As it is not practicable to reliably predict the scale and nature of waste infrastructure and management processes that will be available so far into the future, effects associated with waste generation and disposal at the

Element	Phase	Scoped In	Scoped Out	Justification
				time of decommissioning are scoped out from this chapter, but should be assessed and managed in the decommissioning plan in accordance with best practice at the time.
Impacts and effects 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. Therefore, they are scoped out of the assessment. Furthermore, the Proposed Scheme does not require direct extraction, processing and manufacture of raw resources.
Impacts and effects resulting from the transportation of material resources and waste to and from the site	Construction and Operation		✔	The impacts associated with transportation are considered as part of **Chapter 5: Air Quality**, **Chapter 6: Noise and Vibration**, **Chapter 12: Greenhouse Gases**, and **Chapter 18: Traffic and Transport** – as appropriate to these specialist topics.
Impacts on human health and controlled waters as a result of contaminated site arisings from the Proposed Scheme	Construction and Operation		✔	Impacts and effects on human health and controlled waters are considered in **Chapter 16: Population and Human Health** and **Chapter 9: Water Environment and Flood Risk** assessment, as appropriate to that specialist topic.

14.8. PROPOSED ASSESSMENT METHODOLOGY

14.8.1. The IEMA Guidance (**Ref. 14.23**) will be used to assess the potential impacts and 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 Guidance) will be used to best reflect the scale and nature of the Proposed Scheme.

14.8.2. In accordance with the IEMA Guidance, the assessment will be a quantitative exercise that aims to identify the following:

- The type and volume of materials to be consumed by the Proposed Scheme, including details of any recycled materials content;

- The type and volume of waste to be generated by the Proposed Scheme, with details of planned recovery and / or disposal method (for example on-site reuse, off-site recycling, disposal to landfill);
- The cut and fill balance; and
- Details of any materials to be specified, where sustainability credentials (particularly those that improve resource efficiency) afford performance beyond expected industry standards.

14.8.3. As described previously in this chapter, the sensitive receptors that will be incorporated into the assessment are:

- Material resources – consumption impacts on their immediate and long term availability, resulting in depletion of natural resources; and
- Landfill void capacity – reductions in regional and national infrastructure, resulting in unsustainable use or loss of resources and temporary or permanent degradation of the natural environment.

14.8.4. The impacts from the Proposed Scheme during the construction phase that would 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.

14.8.5. The likely types and estimated quantities of construction material resources required (including site arisings generated) for the Proposed Scheme will be assessed. Impacts and effects will be evaluated against data for the regional and national materials markets, where information is available.

14.8.6. The likely types and estimated quantities of construction waste to be generated by the Proposed Scheme will be assessed. Impacts will be evaluated against the capacity of regional (or where justified, national) waste management infrastructure.

SIGNIFICANCE OF EFFECT CRITERIA

Sensitivity

14.8.7. The criteria for assessing sensitivity of materials and waste is set out in **Table 14-10**.

Table 14-10 - Materials and waste sensitivity criteria

Sensitivity	Materials criteria On balance, the key materials required for the construction of the Project…	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 are available comprising a high proportion of sustainable features and benefits compared to industry-standard materials.	...reduce minimally: by <1% as a result of wastes forecast.	...reduce minimally: by <0.1% as a result of wastes forecast.
Medium	Are forecast (through trend analysis and other information) to suffer from some potential issues regarding supply and stock; and/or 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 production, supply and/or stock; and/or comprise no sustainable features and benefits compared to industry-standard materials.	... reduce very considerably (by>10%); end during construction or operation; is already known to be unavailable; or, would require new capacity or infrastructure to be put in place to meet forecast demand.	... reduce very considerably (by >1%); end during construction or operation; is already known to be unavailable; or, would require new capacity or infrastructure to be put in place to meet forecast demand.

Sensitivity	Materials criteria On balance, the key materials required for the construction of the Project…	Inert and non-hazardous waste criteria Landfill void capacity is expected to…	Hazardous waste criteria Landfill void capacity is expected to…
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; and/or ▪ in some other way reduce lifetime environmental impacts.		

Magnitude

14.8.8. **Table 14-11** sets out the criteria for assessing magnitude of materials and waste. For the purposes of the assessment, Method W1 (void capacity) as set out in the IEMA Guidance (**Ref. 14.23**), will be used.

Table 14-11 - Materials and Waste Magnitude Criteria

Magnitude	Materials Criteria The assessment of the Project 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; and/or the development has the potential to adversely and substantially*** impact access to one or more allocated mineral site (in their	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%

Magnitude	Materials Criteria The assessment of the Project 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
	entirety), placing their future use at risk.		
Moderate	...one or more materials is between 6-10% by volume of the regional* baseline availability; and/or one allocated mineral site is substantially*** sterilised by the development rendering it inaccessible for future use.	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; and/or more than one allocated mineral site is substantially*** sterilised by the development rendering it inaccessible for future use.	Waste generated by the development will reduce regional* landfill void capacity baseline** by >10%.	Waste generated by the development will reduce national landfill void capacity baseline** by >1%
Notes	* or where justified, national. ** forecast as the worst-case scenario, during a defined construction phase. *** justified using professional judgement, based on the scale and nature of the allocated mineral site being assessed.		

Significance of effects

14.8.9. In accordance with the IEMA Guidance (**Ref. 14.23**), the significance of effects from materials and waste will be determined by comparing sensitivity and magnitude within the significance of effects matrix provided in **Table 14-12**.

Table 14-12 - Matrix to assign Significance of Effects Category

		Magnitude of impact				
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
Sensitivity of receptor	**Very high**	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

Effect threshold

14.8.11. Effects that are classified as Moderate, Large or Very Large are considered to be Significant, for both materials and waste.

14.8.12. Effects classified as Slight or Neutral are considered to be Not Significant in either case.

14.9. LIMITATIONS AND ASSUMPTIONS

14.9.1. To ensure transparency within all stages of the EIA process, the following limitations and assumptions have been identified:

Materials

- The assessment of materials is based upon the validity of the collated information, regarding the resources that are expected to be consumed during the 'in scope' lifecycle phases of the Proposed Scheme;
- The assessment baseline uses the most recent available data, which is up to and including 2022 (unless stated otherwise); and
- A lifecycle assessment (including embodied carbon and water) of materials has not been included, as the effort and resources required to complete such an exercise are deemed disproportionate to the benefit they would offer the assessment of significance of effects. Furthermore, many of the elements assessed within a lifecycle assessment are not directly relevant to the goals of this chapter. Embodied carbon (as part of a whole life carbon assessment) is assessed in **Chapter 12: Greenhouse Gases** of this report.

Waste

- The assessment of impacts and effects on landfill void capacity will be based upon the validity of the collated information, regarding the waste generated and disposed of by the Proposed Scheme during 'in scope' phases of the development;
- The assessment baseline uses the most recent available data, which is up to and including 2021 (unless stated otherwise); and
- Landfill operators can claim commercial confidentiality for their data at the time of submission to the Environment Agency; data for sites with a commercial confidentiality agreement in place are therefore unavailable for the analyses presented in this chapter.

14.10. REFERENCES

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15. SOCIO-ECONOMICS

15.1. INTRODUCTION

15.1.1. This chapter considers the impacts of the Proposed Scheme on Socio-economics during construction and operation, and any potential significant effects. The Socio-economic assessment will include employment generation and demand for accommodation and community facilities. The chapter sets out the proposed methodology for the Socio-economic assessment and identifies those impacts that can be scoped out of the assessment. Where relevant, further assessment will be presented in the ES.

15.2. POLICY, LEGISLATION AND GUIDANCE

15.2.1. There are no legislative requirements which exist in relation to Socio-economics, therefore the assessment is guided by the Government's planning policy and guidance. The policy and guidance relevant to the assessment of Socio-economics and the Proposed Scheme is as follows:

Table 15-1 – Socioeconomics - Summary of Key Policy, and Guidance

Policy / Guidance	Description
Policy	
National Planning Policy Framework (NPPF) 2021 **(Ref 15.1)**	Published by the UK Government, the NPPF sets out planning policies and how these are expected to be applied. Paragraph 82a outlines that planning policies should *"set out a clear economic vision and strategy which positively and proactively encourages sustainable economic growth"*.
National Policy Statement for Energy EN-1 2011 **(Ref 15.4)**	The National Policy Statement (NPS) sets out national policy for the delivery of major energy infrastructure. It has effect for the decisions by the Secretary of State on applications for energy developments that are nationally significant. Paragraph 4.2.2 'Environmental Statement' states "*To consider the potential effects, including benefits, of a proposal for a project, the IPC 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 5.12: '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 National Policy Statement for Energy EN-1 2023 **(Ref 15.5)**	The National Policy Statement updated for 2023 is a draft version, currently at consultation stage at the time of writing, therefore reference

Policy / Guidance	Description
	will be drawn from this version. However, the 2011 version is still in to be used as official policy. Paragraph 4.2.4 reiterates Paragraph 4.2.2 from National Policy Statement for Energy EN-1 2011. 5.13 'Socio-Economic Impacts' sets out how *"The construction, operation and decommissioning of energy infrastructure may have socio-economic impacts at local and regional level…* *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…* *The applicant is strongly encouraged to engage with relevant local authorities during early stages of project development so that the applicant can gain a better understanding of local or regional issues and opportunities."*
The North East of England Plan Regional Spatial Strategy to 2021 2008[1] **(Ref 15.2)**	The North East of England Plan is the Regional Spatial Strategy (RSS) for the North East of England. The Plan outlines a broad development strategy for the region for the period to 2021. Theme 3A: 'Delivering Economic Prosperity and Growth' provides a framework for economic development, skills and training, and regeneration to deliver an *"Urban and Rural Renaissance".* The theme outlines the aim to strengthen the regional economy by encouraging economic activity in both urban and rural areas. It seeks to ensure economic diversity, by recognising the region's strong position in industries such as the renewable energy sector.
North East Strategic Economic Plan 2022 **(Ref 15.3)**	The North East Strategic Economic Plan aims to create *"100,000 more and better jobs for the North East economy", stating* *"Our aim is to deliver on national energy policy, while driving growth in the North East. We will deliver on national and regional decarbonisation goals through unique North East energy projects and make the North East the go-to place to develop and showcase new energy solutions that change the world".*
Stockton-on-Tees Borough Council Local Plan 2019 **(Ref 15.6)**	Adopted in 2019, the Stockton-on-Tees Borough Council Local Plan sets out how the Council will develop the borough until 2032. It contains a number of 'Strategic Priorities' which outline goals for the Borough over the plan period, several of which relate to the economy and employment. Strategic Priority 1: *"To encourage economic growth, job creation and a more entrepreneurial culture within the Borough, as a means of*

[1] It is acknowledged that the RSS covers the period to 2021, however this document remains live as relevant guidance on the Redcar and Cleveland Planning Policy web page and provides useful context for overarching economic development aims. There are no known plans to publish an updated RSS at the time of writing.

Policy / Guidance	Description
	diversifying the economic base and strengthening existing economic strengths, clusters and sectors." Strategic Priority 2: *"To identify sufficient employment sites and premises to ensure the needs of inward investors, as well as existing and new businesses, are met."*
Guidance	
Homes and Communities Agency Employment Density Guide 3rd Edition 2015[2] (**Ref 15.6**)	The Homes and Communities Agency (HCA) (now Homes England) provides an employment density matrix for the different use classes, as a guide for future employment assessment.
Homes and Communities Agency Additionality Guide 4th Edition 2014[3] **(Ref 15.7)**	The HCA outlines guidance for composite multipliers (the combined effect of indirect and induced multiplier effects) for displacement and leakage rates that should be applied as part of the assessment of employment generation.

15.3. STUDY AREA

15.3.1. The study area for this Socio-economic Scoping Chapter varies according to receptor. In the absence of statutory guidance on Socio-economic assessments, reference has been made to planning policy, best practice guidance and professional judgement / experience. The Study Area for employment generation follows guidance set out within the Employment Density Guide 3rd Edition (**Ref 15.6**) and Additionality Guide 4th Edition (**Ref 15.7**).

15.3.2. For the purposes of this assessment, a broad 'local' Study Area has been defined as including the local authorities of Stockton on Tees (where the Site is located), Middlesbrough, and Redcar and Cleveland. The 'regional' study area encompasses North East England. Those Socio-economic receptors for which some specific geographical parameters can be applied in relation to the Proposed Scheme site are outlined below.

EMPLOYMENT GENERATION

15.3.3. The economic impact of the Proposed Scheme is considered relative to North East England, as this represents the principal labour market catchment area. Stockton on Tees (where the Proposed Scheme is located) is accessible from all areas of the

[2] Whilst this guidance document was withdrawn in 2022 (due to the Homes and Communities Agency being replaced by Homes England), no statement on replacement guides published by the UK Government has been made. Both guidance documents are still available for reference, and are currently used by many local authorities and public bodies in the absence of a replacement. It is considered that in the absence of any further guidance on employment density and additionality, these documents remain relevant and appropriate guidance documents.

[3] Ibid.

North East, and is likely to be served by labour from the wider region rather than just restricted to the local labour market; particularly given the scale and nature of the Proposed Scheme. The North East labour market incorporates the population that may reasonably be expected to travel to and benefit from the Proposed Scheme. The study area for economic impacts follows guidance set out within the Employment Density Guide 3rd Edition (**Ref 15.6**) and Additionality Guide 4th Edition (**Ref 15.7**).

INCREASED DEMAND FOR ACCOMMODATION FROM TEMPORARY WORKERS

15.3.4. Any workers employed at the Site during the construction phase are likely to require access to local accommodation, should they be drawn from a wider geographical area outside of the region. This may be due to the requirement for a specialist construction skill or activity. Given that any workers who are temporarily relocating to the local area during construction will likely reside within the locality, the surrounding settlements within an approximately 2km radius from the Site will be considered. In addition to this, the settlements of Coatham, Seaton Carew, Haverton Hill, Billingham, and parts of Middlesbrough and Stockton on Tees are also relevant for consideration, given that these are larger settlements which offer a range of local amenities including temporary accommodation, hotels, and other services. The extent of the study area has been determined based on professional judgement and is deemed appropriate to capture the receptors most likely to be affected by the Proposed Scheme.

15.4. BASELINE CONDITIONS AND FUTURE BASELINE

15.4.1. A summary of baseline conditions is presented below. Crime and Safety have been omitted from this baseline study under the assumption that as the Proposed Scheme is located within a private industrial estate, adequate security and safety measures will be implemented and crime is expected to be a low concern and will not be considered further in this chapter. The key sources of information on socio-economics baseline conditions will be:

- NOMIS Labour Market Profiles (**Ref 15.9**); and
- Online mapping services.

BASELINE

Population

15.4.2. The 2021 population estimates for Stockton-on-Tees, Middlesbrough and Redcar and Cleveland were 197,000, 143,700, and 136,600 respectively. In the North-East of England there were a total of 2,646,800 residents. The estimated working age population aged 16-64 as a percentage of the total resident population in in Stockton-on-Tees, Middlesbrough, Redcar, the North East, and Great Britain is shown in **Table 15-2**.

Table 15-2 - Population aged 16-64 (% of the resident population)

Stockton-on-Tees	Middlesbrough	Redcar and Cleveland	North East	Great Britain
61.4%	62.3%	58.9%	61.8%	62.9%

15.4.3. As shown above, the proportion of working age individuals aged 16-64 in all three local authority areas is broadly in line with North East levels, and the Great Britain average.

15.4.4. Further baseline conditions for Population are outlined in **Chapter 16: Population and Human Health**.

Economy and Employment

15.4.5. The NOMIS Job Densities Report (**Ref 15.9**) is available on a Local Authority-wide and sub-regional level and indicates the availability of employment and labour demand. As of 2021 (the most recently available data at the time of writing), the job density levels (i.e. the ratio of total jobs to the population aged 16-64) in Stockton-on-Tees was 0.77. This compares with 0.82 in Middlesbrough, and 0.56 in Redcar and Cleveland. Levels in Stockton on Tees and Middlesbrough are broadly in line with the North East (0.75) and Great Britain levels (0.85), indicating similar rates of employment opportunities. Within Redcar and Cleveland however, employment rates are somewhat lower when compared with Stockton on Tees and Middlesbrough, and the North East and Great Britain as a whole, indicating fewer opportunities within this local authority area.

15.4.6. There were estimated to be 85,000 jobs in Stockton-on-Tees in 2021 of which 68.2% were full-time and 31.8% part-time. In Middlesbrough there were 63,000, of which 66.7% were full time and 33.3% were part time. In Redcar and Cleveland there were 38,000 jobs, 63.2% of which were full time and 39.5% were part time. There is a broadly similar breakdown of full time and part time jobs in Stockton on Tees and Middlesbrough, however a slightly higher proportion of part time jobs, and lower proportion of full time jobs available in Redcar and Cleveland.

15.4.7. **Table 15-3** shows the proportion of total employees working in each industry sector in 2021. Across the three local authorities, a significant proportion of employee jobs were in Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles sector (Sector G) at 15.3% in Stockton on Tees, 14.3% in Middlesbrough, and 14.8% in Redcar and Cleveland. This is slightly higher than the proportion in the North East (13.9%) and Great Britain (14.4%).

15.4.8. Other notable employment trends are the proportion of (Sector B) Mining and Quarrying employees in Redcar and Cleveland (1.3%) which is approximately ten times greater than within Stockton on Tees, and Middlesbrough (0.1% and 0.0%

respectively). Rates of Manufacturing (Sector C) within Stockton on Tees and Redcar and Cleveland are over twice as high as within Middlesbrough (11.8%, 10.5%, and 4.0% respectively). Similarly, rates of Professional, Scientific and Technical activities (Sector M) within Stockton on Tees and Redcar and Cleveland are over twice as high as within Middlesbrough (9.4%, 9.2%, and 4.8% respectively).

Table 15-3 - Overview of employee jobs by industry sector in 2021 (%)

Industry Sector	Stockton-on-Tees	Middlesbrough	Redcar and Cleveland	North East	Great Britain
B: Mining and quarrying	0.1	0.0	1.3	0.1	0.1
C: Manufacturing	11.8	4.0	10.5	9.2	7.6
D: Electricity, gas, steam and air conditioning supply	0.2	0.5	0.1	0.4	0.4
E: Water supply; sewerage, waste management and remediation activities	1.2	0.3	1.6	0.8	0.7
F: Construction	7.1	4.0	4.6	5.0	4.9
G: Wholesale and retail trade; repair of motor vehicles and motorcycles	15.3	14.3	15.8	13.9	14.4
H: Transportation and storage	5.9	4.0	7.9	5.3	5.1
I: Accommodation and food service activities	8.2	6.3	9.2	8.7	7.5
J: Information and communication	2.9	2.4	0.5	2.9	4.5
K: Financial and insurance activities	2.6	2.0	0.4	1.9	3.6
L: Real estate activities	1.1	2.8	2.6	1.8	1.8

Industry Sector	Stockton-on-Tees	Middlesbrough	Redcar and Cleveland	North East	Great Britain
M: Professional, scientific and technical activities	9.4	4.8	9.2	6.8	8.9
N: Administrative and support service activities	8.2	7.9	5.9	7.4	8.9
O: Public administration and defence; compulsory social security	4.1	6.3	4.6	6.8	4.6
P: Education	8.2	11.1	9.2	10.2	8.8
Q: Human health and social work activities	10.6	27.0	13.2	15.2	13.7
R: Arts, Entertainment and Recreation	1.5	1.6	2.6	1.7	2.3
S: Other service activities	1.5	1.3	1.3	1.8	1.9

15.4.9. The results in the table show data from the NOMIS Job Densities Report which is sourced from the open access ONS Business Register and Employment Survey. The data presents a proportion of total employee jobs excluding farm-based agriculture in each industry sector. As presented in the table, the data shows the prominent role of industrial employment in the Study Area.

Index of Multiple Deprivation

15.4.10. The English Indices of Multiple Deprivation (IMD) (**Ref 15.10**) uses a combination of information relating to seven 'domains': income; employment; health deprivation and disability; education, skills and training; barriers to housing and services; crime; and living environment to create an overall score of deprivation. Deprivation is scored between 1 and 317 (representing the 317 local authority districts within England), with a score of 1 being most deprived and 317 being least deprived.

15.4.11. The IMD 2019 ranks Stockton-on-Tees 113th of the 317 local authority districts in England. The Site falls within the Stockton-on-Tees 003B LSOA, which is amongst the 10% most deprived neighbourhoods in England. By comparison, Middlesbrough is ranked as the 16th most deprived, and Redcar and Cleveland the 62nd most deprived local authority in England. This suggests a moderately high level of deprivation within the local study area as a whole, however with significant pockets of deprivation in certain geographies.

Local Employment Context

15.4.12. Brownfield sites are to be redeveloped into the SAF Plant element of the Proposed Scheme. The existing Tees Valley 1 (TV1) and Tees Valley 2 (TV2) facilities will be demolished, providing a brownfield site for development of the Proposed Scheme. Businesses in the immediate local area to the Proposed Scheme are heavily industrial, therefore the Proposed Scheme will be in alignment with the surrounding environment.

15.4.13. Descriptions of surrounding businesses are presented below for context:

- North Tees Limited is a is a Landholding, Estates Management and Development Company. The North Tees Complex is a privately owned industrial estate on which the Proposed Scheme will be based. The company provides tenants with net zero carbon energy sources in a future proofed, world class industrial site;
- Navigator Terminals Limited is a fuel supplier and the UK's leading independent bulk liquid storage providers. One of their four terminals (North Tees) is located within the Site, while Seal Sands is located outside the Site but within close proximity to the Proposed Scheme;
- Tees Renewable Energy Plant (REP) is a biomass site proposed by MGT Teesside, a subsidiary of MGT Power. Tees REP is expected to generate approximately 600 construction jobs and 100 jobs during operation, contributing approximately £20m a year to the local economy;
- Industrial Chemicals Limited are an independent company supplying an extensive range of products including both bulk and packed chemicals to a variety of industries and sectors, such as agriculture, water utilities, steel production, energy utilities, pharmaceuticals, and homecare products; and
- BOC is the UK’s largest provider of industrial, medical, and special gases in the UK and Ireland and has been operating in Teesside for one hundred years. BOC Teesside Hydrogen is located close to the Proposed Scheme and is increasingly focussing on decarbonisation and hydrogen activities.

Local Accommodation Context

15.4.14. There are a range of accommodation options and providers within an approximately 2km radius of the Site, including larger hotel chains, B&Bs, serviced apartments and Apart-hotels. Within Middlesbrough (within 2km) there are: four chain hotels and one serviced apartment to the west of the Site; and one serviced apartment to the south of the Site. In the wider area, there are concentrations of B&Bs and hotels in nearby coastal locations such as Coatham and Warrenby.

FUTURE BASELINE

15.4.15. As the Proposed Scheme is located in a heavily industrial area, the surroundings are likely to remain the same in the medium to long term. The Stockton-on-Tees Borough

Council Local Plan (**Ref 15.4**) outlines targets for economic growth in the period to 2032, which encourage industrial activities. It is likely that in the absence of the Proposed Scheme, similar heavy industrial activities would arise on the Site.

15.5. SENSITIVE RECEPTORS

15.5.1. The identified Sensitive Receptors are as follows:

- Local economic receptors, including working age individuals within the local and regional level study areas, who would access jobs during the construction and operational phases of the Proposed Scheme.
- Local business/community receptors, including accommodation providers, services, and facilities who will serve construction workers either through supply chain linkages, or directly during the construction phase of the Proposed Scheme.

15.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION AND OPERATION PHASE

15.6.1. Relevant design, mitigation and enhancement measures will be identified in the ES. These are likely to include the adoption of Best Practicable Means, such as:

- The Applicant would work proactively to provide local employment opportunities and to enable access to training where possible; and
- The processes used to recruit and manage staff working at the Proposed Scheme would be demonstrably fair and offer equal opportunities to all.

15.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

15.7.1. The potential effects associated with the construction phase include:

- Generation of direct, indirect and induced employment opportunities for construction workers on site, as well as manufacturing services and suppliers; and
- Increased demand for accommodation and community facilities due to an influx of construction workers.

OPERATION PHASE

15.7.2. The potential effects associated with the operation phase include:

- Generation of permanent direct, indirect and induced employment opportunities associated with the Proposed Scheme including approximately 115 direct full-time employees (FTEs) at the SAF Plant, approximately 120 FTEs at other facilities forming part of the Proposed Scheme (and an additional 40 at a Materials Recycling Facility (MRF) elsewhere in the UK) and approximately 600 FTEs from indirect jobs at other locations in the UK,

- Growth opportunities for manufacturing services and suppliers for maintenance activities; and
- Income of the employees that is to be spent in the local area.

DECOMMISSIONING PHASE

15.7.3. The potential effects associated with the decommissioning phase include:

- Generating jobs due to decommissioning works; and
- Loss of jobs due to closure of Proposed Scheme.

ELEMENTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

15.7.4. The elements scoped in or out for the Socio-economic assessment are as follows:

Table 15-4 - Elements Scoped in or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Employment generation (direct, indirect and induced)	Construction	✔		The construction of the Proposed Scheme is anticipated to generate direct, indirect and induced employment opportunities, which are likely to give rise to a significant beneficial effect. Temporary construction employment generation is likely to be significant in the context of local and regional employment markets, benefiting residents in the local and regional study areas. Given the potential for significant numbers of direct, indirect and induced construction jobs which are anticipated to be created during construction of the Proposed Scheme, this has been scoped in for further assessment.
Employment generation (direct, indirect and induced)	Operation		✔	The Proposed Scheme is anticipated to generate permanent direct, indirect and induced employment. Whilst this would be beneficial in generating new operational employee jobs in the local and regional areas, given the nature of the Proposed Scheme, it is not considered likely that these will have a significant effect in the context of

Element	Phase	Scoped In	Scoped Out	Justification
				the overall employment markets. Therefore, operational employment generation as a result of the Proposed Scheme has been scoped out and will not be considered further for assessment.
Increased demand for accommodation due to an influx of temporary workers	Construction	✔		Whilst it is assumed that the majority of direct, indirect and induced employment opportunities will be made available to employees in the study area and the wider region, some elements or phases of construction will require the employment of specialist contractors. This could require contractors to temporarily reside in locations close to the Site and give rise to a significant increase in demand for accommodation local to the Proposed Scheme. This is likely to deliver a beneficial effect on the local economy therefore, this has been scoped in for further assessment.
Increased demand for community infrastructure and services due to an influx of temporary workers	Construction		✔	Whilst it is assumed that specialist contractors will be required for some of the construction activities, and they are likely to reside within the local area, it is not anticipated that this would give rise to a significant increase in demand for community infrastructure and services local to the Proposed Scheme. It is not anticipated that specialist contractors would choose to relocate their families based on previous experience of similar projects, hence there would be little to no additional requirement for education and wider community services. Medical and welfare facilities would be accessible to construction workers in association with employment on-site. As a negligible effect is anticipated for an increase in demand for community infrastructure and services, it has

Element	Phase	Scoped In	Scoped Out	Justification
				been scoped out and will not be considered further for assessment.
Employment generation (direct, indirect and induced)	Decommissioning		✔	It is the assumption for the EIA that most elements of the Proposed Scheme will be decommissioned at the end of the operational lifespan, either prior to or at 30 years, taking approximately 15 -18 months. The decommissioning works would therefore be completed in less time than the construction of the Proposed Scheme (four-year construction period). Given the nature of the decommissioning works and the length of the decommissioning period, the effects would be less than the construction of the Proposed Scheme. However, due to the limited information available and unknown decommissioning processes that will be available at the time the works are expected to take place, it is difficult to accurately predict the employment generation. Therefore, this has been scoped out of this chapter. However, it should be assessed and managed in the decommissioning plan if deemed appropriate.
Loss of employment opportunities	Decommissioning		✔	As part of decommissioning, the jobs generated during the operational phase (as set out in paragraph 15.7.2) could be lost. However, it may be that the Applicant is able to re-deploy these members of staff through retainment or re-skilling. Due to limited information available at the time of writing, it is difficult to know the extent of employment opportunities that would be lost. Therefore, this has been scoped out of this chapter. However, it should be assessed and managed in the decommissioning plan.

15.8. PROPOSED ASSESSMENT METHODOLOGY

15.8.1. There are likely to be significant effects on Socio-economics during construction of the Proposed Scheme. Further assessment that is proposed to be undertaken for the ES is outlined below.

EMPLOYMENT GENERATION

15.8.2. The assessment of likely significant effects relating to employment generation during the construction phase will be undertaken using Excel based analysis. Employment will be based on the construction duration and cost, and will be estimated by applying an average gross output per construction industry employee to the estimated total construction cost. Leakage, displacement, and multiplier effects are then taken into account to determine the total net employment.

Leakage

15.8.3. Leakage effects are the *"proportion of outputs that benefit those outside of the intervention's target area or group"* (**Ref 15.6**). Leakage rates will be applied to construction employment calculations. On the basis of travel to work data, past experience and expert judgement, a medium leakage rate (as set out in the HCA Additionality Guidance) of 25% has been applied.

Displacement

15.8.4. 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 phase of the Proposed Scheme cannot simply be treated as a net benefit as it has the potential to remove workers from other positions, and the net benefit is therefore reduced by the extent that this occurs.

15.8.5. Overall it is assumed that, due to the flexibility of the labour market and the fact that construction workers at the Proposed Scheme are likely to represent a small proportion of the regional construction labour force, displacement of the direct construction employment will be low. Within the context of a North East construction project, a low level of displacement of 25% is considered appropriate, where "*there are expected to be some displacement effects, although only to a limited extent*" (**Ref 15.6**).

Multiplier Effects

15.8.6. In addition to the direct employment generated by the Proposed Scheme itself, there will be an increase in local employment arising from "*further economic activity (jobs, expenditure or income) associated with additional local income and local supplier purchases*"; the indirect and induced effects of the construction activity (**Ref. 15.6**). Employment growth will 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 will be spent in the region, generating further employment (induced or income multipliers).

15.8.7. 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 HCA Additionality Guidance (**Ref. 15.6**) provides a guide to the composite multipliers (the combined effect of indirect and induced multiplier effects) which should be applied. A medium multiplier of 1.5 will be applied on the basis that there are likely to be average supply linkages associated with the Proposed Scheme, based on its location within North East England.

INCREASED DEMAND FOR ACCOMMODATION FROM TEMPORARY WORKERS

15.8.8. An evaluation of the likely number of additional individuals coming to live in the study area will be undertaken, based on assumptions made by the applicant associated with travel planning, construction methodologies, and the construction programme. A percentage of the overall construction employment workforce will be determined based on these factors. Consideration will be given to any additional pressure which may arise on local accommodation facilities, in the context of existing availability and demand within the local area.

SIGNIFICANCE OF EFFECT CRITERIA

15.8.9. The methodology for assessing Socio-economic impacts will follow standard EIA guidance and will involve:

- Consideration of local policy, plans and development constraints;
- Assessment of the likely scale, permanence and classification of impacts; and
- An assessment of the residual and cumulative impacts of the Proposed Scheme.

15.8.10. The assessment will consider the likely direct, indirect and cumulative impacts associated with socio-economics during demolition and construction. Cumulative impacts associated with the Proposed Scheme will be addressed in **Chapter 18: Cumulative Effects** of the ES. For Socio-economics there is no accepted definition of what constitutes a significant (or not significant) socio-economic effect. It is however recognised that classification of an effect reflects the relationship between the scale of an impact (magnitude) and the sensitivity (or value) of the affected resource or receptor.

15.8.11. As such Socio-economic 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 diverse nature and scale. However, the assessment takes account of the qualitative (rather than quantitative) ‘sensitivity’ of each receptor and, in particular, their ability to respond to change based on recent rates of change and turnover (if appropriate); and

- Magnitude of the impact: This entails consideration of the size of the effect on people or business in the context of the area in which effects will be experienced.

15.8.12. Scope for adjustment or mitigation:

- The socio-economic study is concerned in part with economies. These adjust themselves continually to changes in supply and demand, and the scope for the changes brought about by the project to be accommodated by market adjustment will conform to that outlined in **Table 3-1** of **Chapter 3: Approach to EIA**.

15.9. LIMITATIONS AND ASSUMPTIONS

15.9.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- The Socio-economic assessment for the Proposed Scheme will consider employment generation during the construction stage. The baseline conditions and assessment will be undertaken as a desk-based study, using recognised data sources including (but not limited to) Census data and Office of National Statistics Labour Force Statistics.
- The impacts of the socio-economic assessment will be appraised against relevant national standards and/or professional experience and expert judgement where appropriate.

15.10. REFERENCES

Ref. 15.1: 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. 15.2: Government Office for the North East (2008) 'North East Regional Spatial Strategy'. Available at: https://www.redcar-cleveland.gov.uk/sites/default/files/2022-04/North%20East%20of%20England%20Regional%20Spatial%20Strategy.pdf

Ref. 15.3: North East Local Enterprise Partnership (2022) 'North East Strategic Economic Plan'. Available at: https://www.northeastlep.co.uk/wp-content/uploads/2022/05/North-East-Strategic-Economic-Plan-Executive-Summary-Update-Jan-2022.pdf

Ref. 15.4 Department of Energy and Climate Change (2011) 'Overarching National Policy Statement (NPS) 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. 15.5: Department for Energy Security & Net Zero (2023) 'Draft Overarching National Policy Statement (NPS) for Energy EN-1'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf

Ref 15.6 Stockton-on-Tees Borough Council (2019) 'Local Plan'. Available at: https://www.stockton.gov.uk/media/2518/Local-Plan-2019/pdf/Local_Plan_2019.pdf?m=637810468860870000

Ref. 15.7: Homes and Communities Agency (2015) 'Employment Density Guide 3rd Edition 2015'. Available at: https://www.kirklees.gov.uk/beta/planning-policy/pdf/examination/national-evidence/NE48_employment_density_guide_3rd_edition.pdf

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Ref. 15.10: Office for National Statistics (2019). 'English Indices of Deprivation'. Available at: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019

16. POPULATION AND HUMAN HEALTH

16.1. INTRODUCTION

16.1.1. This chapter considers the impacts of the Proposed Scheme on Population and Human Health during construction and operation, and any potential significant effects on land-use and accessibility, and human health. It sets out the proposed methodology for the Population and Human Health assessment and identifies those impacts that can be scoped out of the assessment. Where necessary, further assessment will be presented in the PEIR and 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 follows:

Table 16-1 - Population and Human Health - Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Draft Overarching National Policy Statement (NPS) for Energy EN-1 2023 (**Ref 16.1**)	Paragraph 4.2.4 states that the Environmental Statement (ES) should *"consider the potential effects, including benefits, of a proposal for a project, the applicant must set out information on the likely significant environmental, social and economic effects of the development, and show how any likely significant negative effects would be avoided, reduced, mitigated or compensated for, following the mitigation hierarchy. This information could include matters such as employment, equality, (…), community cohesion, health and well-being."* Paragraph 4.3.4 states *"(…) where the proposed project has an effect on humans, the ES should assess these effects for each element of the project, identifying any potential adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate."* Paragraph 4.3.6 states "*Opportunities should be taken to mitigate indirect impacts, by promoting local improvements to encourage health and wellbeing, this includes potential impacts on vulnerable groups within society, i.e. those groups which may be differentially impacted by a development compared to wider society as a whole."*
Overarching National Policy Statement (NPS) for Energy EN-1 2011 (**Ref 16.2**)	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*

Policy / Legislation / Guidance	Description
	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".*
National Planning Policy Framework (NPPF) 2021 (**Ref 16.3**)	The NPPF sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally prepared plans for housing and other development can be produced. Paragraph 92 states that *"Planning policies and decisions should aim to achieve healthy, inclusive and safe places."*
North East Inshore and North East Offshore Marine Plan 2021 (**Ref 16.4**)	The North East Marine Plan aims to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan areas which stretches from the Scottish border and Flamborough Head, in Yorkshire. It includes the River Tees. Relevant policies include: ▪ NE-CO-1: Co-existence; ▪ NE-PS-1: Ports, Harbours and Shipping; ▪ NE-ACC-1: Access; ▪ NE-TR-1: Tourism and Recreation; and ▪ NE-SOC-1: Social Benefits.
Stockton-on-Tees Local Plan 2019 (**Ref 16.5**)	The Local Plan sets out the Council's policies and proposals to guide planning decisions and establishes the framework for the sustainable economic growth and development of the Borough up to 2032. Relevant policies include: ▪ Policy TI2 – Community Infrastructure; and ▪ Policy ENV6 – Green Infrastructure, Open Space, Green Wedges and Agricultural Land.
Stockton-on-Tees Open Spaces Strategy 2017 (**Ref 16.6**)	This report provides an evidence base to help inform the future provision of open spaces in Stockton-on-Tees.
Stockton-on-Tees Communities Strategy 2020 (**Ref 16.7**)	The Strategy sets out the vision for the communities to be *"cohesive, strong and welcoming"*.
Legislation	
Countryside and Rights of Way (CROW) Act 2000 (**Ref 16.8**)	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.

Policy / Legislation / Guidance	Description
Equality Act 2010 (**Ref 16.9**)	The Equality Act outlines legislation to protect people from discrimination in the workplace and in wider society, addressing the protected characteristics of: ▪ Age, ▪ Disability, ▪ gender reassignment, ▪ marriage and civil partnership, ▪ pregnancy and maternity, ▪ race, ▪ religion or belief, ▪ sex, and ▪ sexual orientation.
Localism Act 2011 (**Ref 16.10**)	The Localism Act gives rights and powers to both communities and individuals. It is relevant in the context of the Proposed Scheme due to its proximity to recreational facilities.
Guidance	
National Planning Practice Guidance 2021 (**Ref 16.11**)	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 16.12**)	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 16.13**)	This sets out guidance on how new planning proposals should promote health, wellbeing and safety.
Design Manual for Roads and Bridges LA 112 Population and human health 2020 (**Ref 16.14**)	This sets out guidance for assessing and reporting the environmental effects on land use and accessibility, and human health resulting from the construction, operation and maintenance of highways projects.
IEMA Significance Determining Significance for Human Health in Environmental Impact Assessment (2022) (**Ref 16.15**)	This guidance outlines the changes to the way that EIA is undertaken in the UK and Republic of Ireland in relation to human health, including how to assign significance to human health.

16.3. STUDY AREA

16.3.1. The Study Area for land-use and accessibility is defined using the DMRB LA 112 - Population and human health (DMRB LA 112) (**Ref 16.14**), and the Study Area for human health has been determined using the IEMA Health Guidance (**Ref 16.15**).

16.3.2. The DMRB LA 112 advises a Study Area of 500m surrounding the Proposed Scheme to be used to report on the likely effects on land-use and accessibility on private

property and housing, community land and assets, development land and business and walkers, cyclists and horse-riders.

16.3.3. The Study Area for human health has been determined using both professional judgement, energy industry best practice, other schemes and the IEMA health guidance (**Ref 16.15**). The Study Area makes regard to population effects on health and differences between groups in the population For the purpose of the assessment of human health, the Study Area is comprised of the communities closest to the Proposed Scheme, whose populations are most likely to experience changes to their health outcomes. These populations fall within the Billingham South ward within the Stockton-on-Tees Borough Council area and therefore the baseline has been informed by data from these administrative areas.

16.3.4. Study Areas for other chapters used within the human health assessment, such as air quality, noise and vibration, and landscape, will apply where relevant and are defined within the appropriate chapters.

LAND USE AND ACCESSIBILITY

Private Property and Housing

16.3.5. Private properties and housing allocations that lie within 500m of the Site, or those which have a direct means of access through the Site, are included in the Study Area.

Community Land and Assets

16.3.6. Community land (e.g. open spaces) and community assets (e.g. community services, amenities and recreational facilities) that lie within 500m of the Site, or those which have a direct means of access through the Site, are included in the Study Area.

Development Land and Business

16.3.7. Businesses and land allocated for employment that lie within 500m of the Site, or those which have a direct means of access through the Site, are included in the Study Area.

Walkers, Cyclists and Horse-riders (WCH)

16.3.8. Public rights of way (PRoW) and non-designated routes within 500m of the Site, are included within the Study Area.

HUMAN HEALTH

16.3.9. The smallest jurisdiction boundaries for the Proposed Scheme are the Billingham South ward, and the Stockton-on-Tees 003B Lower Super Output Area (LSOA). These jurisdictions form the basis of the Study Area for human health because they are communities that are most likely to experience direct and / or greater impact as a result of the Proposed Scheme.

16.3.10. Datasets for larger jurisdiction boundaries are used to inform the baseline when the data for the ward or LSOA is not available, and for means of comparison against the ward or the LSOA.

16.3.11. The various population profiles reported are as follows:

- National: England;
- Regional: Northeast of England;
- County: Durham;
- Borough: Stockton-on-Tees;
- Wards: Billingham South ward; and
- LSOA: Stockton-on-Tees 003B.

16.4. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

16.4.1. The key sources of information on baseline population, human health, and land use conditions will be:

- Google Maps[1];
- Fingertips Public Health Data (**Ref 16.16**);
- English Indices of Multiple Deprivation (**Ref 16.17**);
- Official Census and Labour Market Statistics (NOMIS) (**Ref 16.18**);
- Tees Joint Strategic Needs Assessment (**Ref 16.19**);
- Stockton-on-Tees Borough Council Local Plan Map Inserts and Policies (**Ref 16.20**);
- Stockton-on-Tees Active Travel Hub (**Ref 16.21**); and
- Sustrans National Cycle Network map[2].

Land Use and Accessibility

Private Property and Housing

16.4.2. Private property is residential land and residential development land that does not accommodate public space or any other community facility or assets. Commercial property is considered under the 'Development land and businesses' section below.

16.4.3. The principal land associated with the Study Area is industrial. Residential areas are located primarily on or off the A178 Port Clarence Road, located adjacent to the southern part of the Site and within the Study Area.

16.4.4. There are no housing allocations located within the Study Area. The nearest housing allocation is located 4.7km northwest of the Site (**Ref. 16.5**).

Community Land and Assets

16.4.5. The following community assets have been identified within the Study Area:

- Westlowthian Street allotments located 120m north of the Site;

[1] https://www.google.com/maps
[2] https://www.sustrans.org.uk/national-cycle-network

- Port Clarence Play Area located 330m northwest of the Site;
- Billingham Community Fire Station located 410m west of the Site;
- Middlesbrough Football Club and Riverside Stadium located 430m south of the Site;
- Middlesborough Docks located 500m south of the Site; and
- Middlesborough College located 500m south of the Site.

16.4.6. There are seven bus stops within the Study Area. These are all located along Seaton Carew Road and provide services between Hartlepool and Middlesborough. The Site is also well served by a rail link that follows part of the western boundary of the Site.

Development Land and Businesses

16.4.7. The Site is located within Tees Valley, an area that works as a connected economic area covering Darlington, Hartlepool, Middlesborough, Redcar and Cleveland and Stockton-on-Tees. The Study Area is dominated by industrial uses. The north bank of the River Tees is occupied by a variety of operations including petro-chemical facilities storage and heavy engineering. Within the Site, this includes:

- Majority of The North Tees Works Oil Refinery (and associated infrastructure including pipelines and storage tanks);
- Material Resource Facility (operated by N+P Group);
- Navigator North Tees Rail Terminal;
- Wilton Engineering Wharf; and
- Clarence Wharf.

16.4.8. Beyond the Site, other land uses include Port Clarence landfill site, Teesside Gas Processing Plant and chemical works.

16.4.9. There are three jetties located within the Site on Riverside Road, two of which will be used during operation of the Proposed Scheme. Further details on these jetties can be found in **Chapter 20: Marine Navigation**

Walkers, Cyclists and Horse-riders (WCH)

16.4.10. The English Coast Path runs along the western edge of the Site on Seaton Carew Road, passing the RSPB Saltholme Nature Reserve. This is a new ten-mile route from Newport Bridge to North Gare which opened in 2019, to provide increased access to the Tees Valley coastline (**Ref 16.22**), and is of national significance. This route is also part of the 9.3km long North Tees Trail walking route from Port Clarence to Seal Sands (**Ref 16.23**).

16.4.11. There are two National Cycle Network (NCN) Routes (NCN Route 1 and NCN Route 65) within the Study Area. NCN Route 1 runs to the south of the Study Area and the River Tees, along Vulcan Street and Riverside Park Road, and NCN Route 65 runs to the south via Cleaveland Street.

16.4.12. There are no further PRoWs identified within the Study Area.

Recreation

16.4.13. The River Tees is used by a variety of users including (**Ref 16.24**):

- Commercial passenger boats;
- Leisure craft - powered and unpowered;
- Smaller craft involved in various river events and activities;
- Water Skiing;
- Jet Skiing;
- Anglers (including a number of angling associations: Stockton Angling Ltd, Thornaby Angling Association, and Yarm Angling Ltd) (**Ref 16.25**);
- Walkers; and
- Canal & River Trust maintenance vessels also operate at various locations on the River Tees.

16.4.14. However, due to the heavy industry use of the River Tees at its mouth, adjacent to the Site, these types of uses are understood to be limited within the Study Area, with the majority of these users operating within the Canal and River Trust managed section of the River Tees further up-river, outside of the Study Area. This is located from the tidal barrage at Stockton-on-Tees, situated 4.5km southwest, up-river from the Site, to Low Worsall, a total distance of approximately 22km form the Site (**Ref 16.24**).

16.4.15. Within the Study Area, the RSBP's Saltholme Nature Reserve is located adjacent to the Site to the west, see **Chapter 7: Terrestrial Ecology** of this Report for more information. The associated Dorman's Pool Nature Reserve is also surrounded by the Site, situated off Huntsman's Drive. The Saltholme Nature Reserve is classified by the RSBP as being a popular family friendly wetland, which includes a visitor centre, hides, family discovery zone, café, play area, and accessible trails (**Ref 16.26**). The Dorman Pool Nature Reserve is for the exclusive use of RSPB members and Teesmouth Bird Club members.

Human Health

Age breakdown

16.4.16. The number and proportion of the population per age group for Billingham South ward, Stockton-on-Tees (in which the Proposed Scheme is located), County Durham, North East, and England is presented below. Overall, Billingham South has a population age profile that is similar to both regional and national averages, however, the Billingham South ward has the lowest working age population (16-64 years) compared to the other jurisdictions at 59.7%. The Billingham South ward also has a significantly larger proportion of elderly people (65+ years) at 20.8% compared to the regional (20.4%) and national (18.4%) averages.

Table 16-2 - Age breakdown for Billingham South, Stockton-on-Tees, County Durham, North East, and England 2021 (Ref 16.27)

Age group (years)	Billingham South (the Ward)		Stockton-on-Tees (the LSOA)		County Durham		North East		England	
	Total	Proportion	Total	Proportion	Total	Proportion	Total	Proportion	Total	Proportion
0-15	1,225	19.4	38,585	19.6	88,108	16.9	468,052	17.7	10,483,094	18.5
16-24	553	8.8	17,904	9.1	58,785	11.3	284,150	10.7	598,9231	10.6
25-64	3,211	50.9	102,922	52.4	263,832	50.5	1,354,255	51.2	29,616,420	52.4
65-84	1,168	18.5	32,871	16.2	98,546	18.9	474,650	17.9	902,9000	16.0
85+	146	2.3	4,312	2.2	12,791	2.5	65,908	2.5	137,2300	2.4

Population health

16.4.17. Overall, the health of the Billingham South ward is similar to the health status at both a regional and national level. The Billingham South ward has a higher percentage of obese children in both reception year and year 6 compared to national averages, as well as significantly higher emergency hospital admissions for coronary heart disease, emergency admissions for COPD, deaths from respiratory disease, limiting long term illness and disability.

Table 16-3 - Indicators of population health for Billingham South, the North East, and England (Ref 16.28)

Indicator	Indicator value	Period	Billingham South	North East	England
Life expectancy at birth for males	Years	2016 – 2020	77.7	77.1	79.5
Life expectancy at birth for females	Years	2016 – 2020	79.5	82.8	83.2
Obese children (reception year)	%	2019/20 – 2021/22	14.3	11.4	9.9
Obese children (year 6)	%	2019/20 – 2021/22	25.0	26.6	21.6
Emergency hospital admissions for coronary heart disease	Standardised admission ratio	2016/17 – 2020/21	160.6	153.7	100
Deaths from coronary heart disease	Standardised mortality ratio	2016 – 2020	119.7	111.1	100
Emergency admissions for COPD	Standardised admission ratio	2016/17 – 2020/21	176.4	159.1	100
Deaths from respiratory disease	Standardised mortality ratio	2016 – 2020	142	112.9	100
Deaths from all cancer (all ages)	Standardised mortality ratio	2016 – 2020	113.4	110.9	100

Indicator	Indicator value	Period	Billingham South	North East	England
Limiting long term illness or disability	%	2011	21.7	19.0	17.6

Indices of deprivation

16.4.18. The English Indices of Multiple Deprivation 2019 (IMD) (**Ref 16.17**) comprised seven different 'domains' which relate to income, employment, education, health, skills and training, barriers to housing, and services to create an overall deprivation score.

16.4.19. The Site falls within the Stockton-on-Tees 003B neighbourhood. This neighbourhood ranked 2,363 out of the 32,844 LSOAs in England, where 1 is the most deprived. Therefore, this neighbourhood is within the 10% most deprived neighbourhoods in England. This neighbourhood is also within the top 10% and 20% most deprived neighbourhoods for income deprivation affecting children index, and income deprivation affecting older people index, respectively.

Air Quality, Landscape, Noise and Water Environment

16.4.20. The Site is not located within or near any existing Air Quality Management Areas.

16.4.21. Residential properties, PRoW users and users of open space, including the Saltholme Reserve have been identified as receptors sensitive to visual effects in the Study Area.

16.4.22. There are two Noise Important Areas (**Ref 16.29**) within the Study Area located on Seaton Carew Road and Port Clarence Road. Residential properties are the predominant sensitive receptor in the Study Area.

16.4.23. Due to the Site being located on the bank of the River Tees, large areas of the Study Area are within Flood Zone 1, indicating a high risk of flooding.

16.4.24. A full review of the health determinates that will inform the baseline conditions for air quality, landscape, noise and water receptors are outlined in **Chapter 5: Air Quality**, **Chapter 10: Landscape and Visual**, **Chapter 6: Noise and Vibration**, and **Chapter 9: Water Environment and Flood Risk**.

FUTURE BASELINE

16.4.25. Between 2018 and 2043, the population of Stockton-on-Tees is anticipated to only increase by 2% (**Ref 16.30**), whereas the population for England is anticipated to increase by 10% in the same period (**Ref 16.31**).

16.4.26. Aging of the population is set to continue, with Stockton-on-Tees population aged 65 and over projected to increase by 46% between 2018 and 2043 (**Ref 16.31**).

16.4.27. This growth is likely to put strain on existing services and require additional housing, facilities, services and infrastructure.

16.5. SENSITIVE RECEPTORS

16.5.1. Land use and accessibility focuses on the potential effects on private property, community land, businesses, and WCH, associated with the Proposed Scheme.

16.5.2. The baseline has identified the following sensitive receptors within the Study Area:

- Individuals who reside in private property or housing within the local area, primarily those located along or off Port Clarence Road;
- Publicly accessible routes and PRoW, including the English Coast Path; and
- Recreational receptors (including both terrestrial and marine).

16.5.3. 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.

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:

- Appropriate diversions being implemented for any WCH routes obstructed during construction in order to minimise effects on accessibility and severance for WCHs. Where appropriate diversions are not available and temporary closures required, these would be done for as short a duration as possible;
- Design of any diverted routes for WCH being appropriately signposted and would consider vulnerable user groups and ensure accessibility is maintained for users with limited mobility wherever possible i.e. resting places;
- A Construction Traffic Management Plan (CTMP) (and an outline CTMP will be prepared and submitted as part of the ES) will be implemented to minimise effects on vehicular travellers and their access between community facilities (**Chapter 18: Traffic and Transport**); and
- Access routes to residential and commercial properties and community assets remaining open throughout the construction period;
- Noise management plans will be applied during construction to minimise noise and vibration impacts of the Proposed Scheme (**Chapter 6: Noise and Vibration**).

16.6.2. Good practice measures will be outlined within the Code of Construction Practice (CoCP) submitted with the ES Stage in order to avoid conflict with WCHs, local residents and recreation facilities and ensure impacts from construction dust, noise and traffic are managed appropriately.

OPERATION PHASE

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

- Careful selecting of low noise plant and equipment, and location of this equipment to minimise noise impacts;
- The use of noise-attenuating barrier in the form of either acoustic screens and/or earth bunds;
- The Applicant would work proactively to provide local employment opportunities and to enable access to training where possible;
- The processes used to recruit and manage staff working at the Proposed Scheme would be demonstrably fair and offer equal opportunities to all;
- Appropriate design of the Proposed Scheme to minimise water quality impacts on surrounding habitats, including waterbodies within RSPB Saltholme and the River Tees; and
- The provision of tree planting to provide visual assimilation and screen low level clutter.

16.6.4. For more detail see mitigation measures outlines within **Chapter 5: Air Quality, Chapter 6: Noise and Vibration, Chapter 10: Landscape and Visual Impact,** as well as **Chapter 15: Socioeconomics.**

16.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

16.7.1. The potential likely significant effects associated with the construction phase includes:
Private Property and Housing

16.7.2. No potential effects associated with the construction phase have been identified.
Community Land and Assets

16.7.3. No potential effects associated with the construction phase have been identified.
Development Land and Business

16.7.4. No potential effects associated with the construction phase have been identified.
Walkers, Cyclists and Horse-riders (WCH)

16.7.5. Effects may arise from disruption to PRoWs, long distance walking routes and NCN routes as a result of an increase in construction traffic and construction related noise (See **Chapter 6: Noise and Vibration** for more details).
Terrestrial Recreation

16.7.6. There may be disturbance to recreational users of the Saltholme Nature Reserve and Dorman Pool Nature Reserve due to an increase in construction traffic utilising the existing private road between the two nature reserves to transport construction material from marine facilities to the Site. There is also likely to be an increase in

construction related noise. See **Chapter 6: Noise and Vibration** and **Chapter 7: Terrestrial Ecology** for more details.

Marine Development Land and Business

16.7.7. Whilst there may an effect on businesses that rely on the River Tees due to the introduction of a new source of vessel traffic, access within the navigation channel will be covered within **Chapter 20: Marine Navigation**.

Marine Recreation

16.7.8. No potential effects associated with the construction phase have been identified.

OPERATION PHASE

Private Property and Housing

16.7.9. No potential effects associated with the operation phase have been identified.

Community Land and Assets

16.7.10. No potential effects associated with the operation phase have been identified.

Development Land and Business

16.7.11. No potential effects associated with the operation phase have been identified.

Walkers, Cyclists and Horse-riders (WCH)

16.7.12. No potential effects associated with the operation phase have been identified.

Terrestrial Recreation

16.7.13. No potential effects associated with the operation phase have been identified.

Marine Development Land and Business

16.7.14. Whilst there may an effect on businesses that rely on the River Tees due to the introduction of a new source of vessel traffic, access within the navigation channel will be covered within **Chapter 20: Marine Navigation**.

Marine Recreation

16.7.15. No potential effects associated with the operation phase have been identified.

ELEMENTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

16.7.16. The impacts scoped in or out for the population, human health and land use assessment are as follows:

Table 16-4 - Elements Scoped in or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Private Property and Housing	Construction and Operation		☑	Due to the limited number of private properties 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 not be significant. Once operational, the Proposed Scheme is not likely to have a significant effect on private property and housing, particularly in the context of the baseline levels of heavy industrial activities at and surrounding the Proposed Scheme Site.
Community Land and Assets	Construction and Operation		☑	There are limited community land uses and assets located within the Study Area. Access to these facilities are likely to be maintained throughout construction and operation therefore, effects are expected to not be significant.
Walkers and Cyclists	Construction	☑		The users of the England Coast Path and the North Tees Trail are likely to be temporarily affected during construction as a result of reduced amenity along the routes.
	Operation		☑	In context of the baseline levels of heavy industrial activities at and surrounding the Proposed Scheme, it is unlikely that operation for the Proposed Scheme will result in any changes to amenity or access along the routes.
Terrestrial Businesses	Construction		☑	Access to businesses is likely to be maintained during construction, therefore no significant effects are likely to occur.
	Operation		☑	Once operational, the Proposed Scheme is not anticipated to result in any impacts to nearby businesses.
	Construction		☑	Whilst there may an effect on businesses that rely on the River Tees due to the

Element	Phase	Scoped In	Scoped Out	Justification
Businesses that rely upon access to the River Tees				introduction of a new source of vessel traffic, access within the navigation channel will be covered within Chapter 20: Marine Navigation.
	Operation		☑	The Proposed Scheme will use the existing marine infrastructure transportation for final products (SAF and naphtha). Therefore, there is likely to be an increase in marine vessels associated with the operation of the Proposed Scheme, however, this is not predicted to impede on businesses that also rely on the river for transportation of materials and goods.
Terrestrial Recreation	Construction	☑		There is potential for the disruption to access and loss of amenity to Saltholme and Doorman Pool Nature Reserves due to an increase in construction traffic and noise levels. This may lead to a permanent, long-term impact on the wildlife (particularly birds) within the nature reserve and therefore, reduce levels of enjoyment and the amenity value of the Site and impact overall visitor numbers.
	Operation		☑	Chapter 7: Terrestrial Ecology outlines the potential for bird species within the Saltholme and Doorman Pool Nature Reserves to be disturbed via noise, vibration, lighting during operation of the Proposed Scheme. Loss of wildlife (particularly birds) could generate a permanent, long-term impact on the nature reserve and its users. This could reduce levels of enjoyment and the amenity value of the site and impact overall visitor numbers.
Recreational users of the River Tees	Operation and Construction		☑	Due to the Proposed Scheme being located within an already heavily industrialised area, the construction works and operation would not significantly decrease the enjoyment of recreational activities along and within the River Tees.

Element	Phase	Scoped In	Scoped Out	Justification
Human Health	Operation and Construction		☑	There is potential for adverse health effects as a result of the Proposed Scheme, however, these are likely to be temporary and minor given the location of the site in an existing industrial area with limited health receptors. Any human health effects detailed in Chapter 5: Air Quality, Chapter 6: Noise and Vibration, Chapter 15: Socioeconomics and Chapter 18: Traffic and Transport will be assessed within those topic's respective ES chapters, and mitigation considered where relevant and appropriate.

16.8. PROPOSED ASSESSMENT METHODOLOGY

16.8.1. The assessment will be qualitative and informed by desk based study, and will rely upon readily available sources as mentioned in Section 16.4 above.

16.8.2. The following methodology for the assessment of likely significant effects identified in **Table 16-4** is proposed in accordance with DMRB LA 104 (**Ref 16.32**) and DMRB LA 112 (**Ref 16.14**). Despite the DMRB being the standard for the assessment of road schemes, this guidance provides an appropriate methodology for assessing Population and Human Health in the context of the Proposed Scheme.

16.8.3. Based on the likely significant effects set out above, professional judgement and experience on similar projects, the scope of the assessment will include the following:

- Disruption and possible diversions to PRoW, long distance walking routes, promoted routes and
- NCN routes during the construction phase; and
- Disruption to recreational facilities and activities (including users of the River
- Tees and the RSPB Saltholme Reserve) during the construction phase.

SIGNIFICANCE OF EFFECT CRITERIA

16.8.4. The significance level attributed to each likely significant 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: Approach to EIA**. The significance of effects shall be determined for each element of the land and accessibility subtopic (e.g. walkers and cyclists and recreation) affected by the Proposed Scheme.

16.8.5. The sensitivity criteria and magnitude of impact of each likely significant effect will be assigned in line with the DMRB LA 112 guidance (**Ref 16.14**) as shown in **Table 16-5** and **Table 16-6** below. Level of significance for land use and accessibility will be assigned in line with Table 3.8.1 in DMRB LA 104 guidance (**Ref 16.31**). Significant

effects for land use and accessibility, comprise effects which are assigned as moderate, large or very large. The remaining effects will be categorised as non-significant, as outlined below:

- **Very High**: Very high importance and rarity, international scale and very limited potential for substitution.
- **High**: High importance and rarity, national scale, and limited potential for substitution.
- **Medium**: High importance and rarity, national scale, and limited potential for substitution.
- **Low**: Low or medium importance and rarity, local scale.
- **Negligible**: Very low importance and rarity, local scale.

16.8.6. The sensitivity criteria for land use and accessibility effects is detailed in **Table 16-5** below.

Table 16-5 - Sensitivity Criteria (Ref 16.14)

Sensitivity	Description
Very high	Walkers and Cyclists: National trails and routes likely to be used for both commuting and recreation that record frequent (daily) use. Such routes connect communities with employment land uses and other services with a direct and convenient WCH route. Little / no potential for substitution.
High	Walkers and Cyclists: PRoW frequently used by walkers and cyclists for commuting, recreational and leisure purposes (e.g. National Trails). Also, for use by vulnerable travellers (e.g. elderly, school children and people with disabilities); Terrestrial Recreation: Recreational activities/facilities (including informal green space) that are of national or international status and/or high visitor numbers.
Medium	Walkers and Cyclists: PRoW moderately used by walkers and cyclists for commuting, recreational and leisure purposes (e.g. regional trails); and Terrestrial Recreation: Recreational activities/facilities (including informal green space) that are of regional status and or medium visitor numbers.
Low	Walkers and Cyclists: 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. Terrestrial Recreation: Recreational activities/facilities (including informal green space) that are of local status and/or low visitor numbers.
Negligible	Walkers and Cyclists: PRoW not/infrequently used by walkers and cyclists for recreational purposes; and

Sensitivity	Description
	Terrestrial Recreation: Recreational activities/facilities (including informal green space) that have very low visitor numbers.

16.8.7. The DMRB LA112 (**Ref 16.14**) categorises magnitude as follows:

- **Major effect**: where the Proposed Scheme could be expected to have a considerable effect (either beneficial or adverse) on receptors.
- **Moderate effect**: where the Proposed Scheme could be expected to have a perceptible effect (either beneficial or adverse) on receptors.
- **Minor effect**: where the Proposed Scheme could be expected to result in a small, barely perceptible effect (either beneficial or adverse) on receptors.
- **Negligible**: Where no discernible effect is expected as a result of the Proposed Scheme on receptors

16.8.8. The magnitude of change shall be reported in line with the criteria outlined in **Table 16-6** below.

Table 16-6 - Magnitude of Impact (Ref 16.14)

Magnitude of Impact	Criteria
Major	Walkers and Cyclists: Permanent loss/severance of an existing recreational or commuting route/resource used by walkers and cyclists. Recreation: 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 Introduction (adverse) or removal (beneficial) of complete severance with no/full accessibility provision.
Moderate	Walkers and Cyclists: Disruption of a recreational or commuting route/resource used by walkers and cyclists with significant increase/decrease in journey length/time. Recreation: 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 recreation asset; and/or Introduction (adverse) or removal (beneficial) of severe severance with limited/moderate accessibility provision.

Magnitude of Impact	Criteria
Minor	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. Recreation: 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 recreation asset; and/or Introduction (adverse) or removal (beneficial) of severance with adequate accessibility provision.
Negligible	Walkers and Cyclists: No change to recreational or commuting route/resource used by walkers and cyclists. Recreation: 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 recreation asset; and/or very minor introduction (adverse) or removal (beneficial) of severance with ample accessibility provision.
No Change	No loss or alteration of characteristics, features, elements or accessibility; no observable impact in either direction.

16.9. LIMITATIONS AND ASSUMPTIONS

16.9.1. To ensure transparency within the EIA process, 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 provide the most up-to-date data available at the time of writing;
- Population impacts would be identified in the ES down to the lowest defined population group available according to Office for National Statistics (ONS) survey outputs (lower super output areas). Further granularity of data is not available. No significant changes or limitations in these datasets have been identified that would affect the outcome of the assessment; and
- The assessment of effects on human health relies on the use of reasonable assumptions, professional judgement, and above guidance (**Section 16.2**) to determine the significance of effects.

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17. GEOLOGY AND SOILS

17.1. INTRODUCTION

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

17.2. POLICY, LEGISLATION AND GUIDANCE

17.2.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is as follows:

Table 17-1 – Geology and Sols – Summary of key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
The National Planning Policy Framework (2021) (NPPF) (**Ref 17.1**)	The NPPF is a document that sets out the Government's planning policies for England and how they are expected to be applied. The NPPF states that the purpose of the planning system is to contribute to the achievement of sustainable development. The NPPF includes specific chapters which relate to the assessment of Geology and Soils as follows: ***Chapter 11: Making effective use of land*** The NPPF states that the planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions (Section 119). ***Chapter 15: Conserving and enhancing the natural environment*** In accordance with Section 174 of the NPPF, the planning system is required to contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils. It should recognise the intrinsic character and beauty of the country side, including the economic and other benefits of the best and most versatile (BMV) agricultural land. It should also seek to prevent new and existing development from contributing to or being put at unacceptable risk from soil or water pollution or land instability. Planning decisions should lead to the remediation and mitigation of despoiled, degraded, derelict contaminated and unstable land, where appropriate. Guidance relating to ground conditions and pollution is provided in Sections 183 & 184 which are quoted below.

Policy / Legislation / Guidance	Description
	"183 - 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. 184 - Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner." ***Chapter 17: Facilitating the sustainable use of minerals*** Section 209 recognises that "*It is essential that there is a sufficient supply of minerals to provide the infrastructure, buildings, energy and goods that the country needs".* Within Section 210 it is stated that appropriate policies should be adopted "*so that known locations of specific minerals resources of local and national importance are not sterilised by non-mineral development where this should be avoided (whilst not creating a presumption that the resources defined will be worked)".*
Overarching National Policy Statement for Energy 2011 (EN-1) (**Ref 17.2**)	Section 5.3 outlines the requirement for biodiversity and geological conservation. It is stated that where the development site is subject to EIA the applicant should ensure that the ES clearly sets our any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance.
Draft Overarching National Policy Statement for Energy 2023 (EN-1) (**Ref 17.3**)	The government has published a draft update to NPS EN-1. For Geology and Soils. This draft is largely the same as EN-1 2011.
Stockton on Tees Borough Council – Local Plan – Adopted 30 January 2019. (**Ref 17.4**)	The Local Plan sets out the Council's policies and proposals to guide planning decisions and establishes the framework for the sustainable economic growth and development of the Borough up to 2032. Chapter 8 of the Local Plan relates to the Natural, Built and Historic Environment. The following policies relate to the assessment of Geology and Soils. Policy ENV5 – Preserve, Protect and Enhance Ecological Networks, Biodiversity and Geodiversity Within the Local Plan, Stockton on Tees Borough Council pledge to protect and enhance the biodiversity and geological resources within the Borough. It is stated that development that is likely to have an adverse effect on a site will not normally be allowed unless the following applies:

Policy / Legislation / Guidance	Description
	i) the benefits of the development clearly outweigh both any adverse impact on the sites notified interest features, and any broader impacts on the national network of SSSI's; ii) no reasonable alternatives are available; and iii) mitigation, or where necessary compensation, is provided for the impact. It is stated that "*Development proposals should seek to achieve net gains in biodiversity wherever possible. It will be important for biodiversity and geodiversity to be considered at an early stage in the design process so that harm can be avoided and wherever possible enhancement achieved (this will be of particular importance in the redevelopment of previously developed land where areas of biodiversity should be retained and recreated alongside any remediation of any identified contamination."* **Policy ENV6 – Green Infrastructure, Open Space, Green Wedges and Agricultural Land** It is stated that *"Development proposals will be expected to demonstrate that they avoid the 'best and most versatile' agricultural land unless the benefits of the proposal outweigh the need to protect such land for agricultural purposes. Where significant development of agricultural land is demonstrated to be necessary, proposals will be expected to demonstrate that they have sought to use areas of lower quality land in preference to that of a higher quality"*. **Policy ENV7 – Ground, Air, Water, Noise and Light Pollution** It is stated that *"Where future users or occupiers of a development would be affected by contamination or stability issues, or where contamination may present a risk to the water environment, proposals must demonstrate via site investigation/assessment that:* *a. Any issues will be satisfactorily addressed by appropriate mitigation measures to ensure that the site is suitable for the proposed use, and does not result in unacceptable risks which would adversely impact upon human health and the environment; and* *b. Demonstrate that development will not cause the site or the surrounding environment to become contaminated and/or unstable."*
Legislation	
Environmental Protection Act 1990 (**Ref 17.5**)	This is the key regulatory regime relating to historical land contamination. Part 2A of the Environmental Protection Act 1990 describes a regulatory role for local authorities and provides local authorities with the power to inspect land to identify land which is contaminated within the meaning of the Part 2A definition, to establish liability and to ensure its remediation. In England and Wales the Part 2A regime consists of three main legislative / statutory elements, these are Part 2A itself, the Statutory Guidance and the Regulations.

Policy / Legislation / Guidance	Description
Contaminated Land Regulations (England), 2006 (amended 2012) (**Ref 17.6**)	Regulation 3 provides a definition of what constitutes 'contaminated land' and sets out the responsibilities of the local authority and the Environment Agency in the identification and management of contaminated land. Contaminated land assessment works associated with Part A are to be conducted in accordance with these regulations.
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (**Ref 17.7**)	Legislation that seeks to establish an integrated approach to the protection and sustainable use of the water environment.
Environmental Damage (Prevention and Remediation) (England) Regulations 2015 (**Ref 17.8**)	These Regulations aim to prevent serious environmental effects or ensure that remediation is carried out. The emphasis is on encouraging operators to put in place appropriate pollution prevention measures and where appropriate agreed voluntary remedial action. The Regulations specifically define three types of environmental damage: biodiversity damage to European Union protected species and habitats and Sites of Special Scientific Interest (SSSI); water damage; and land damage.
The Environmental Permitting (England and Wales) Regulations 2016 (**Ref 17.9**)	These regulations 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 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, procedure for environmental permitting, enforcement notices and other enforcement measures and powers of the regulator.
Control of Substance Hazardous to Health Regulations (COSHH) 2002 (**Ref 17.10**)	Under COSHH employers are required to control substances that are hazardous to health. It outlines a precautionary approach to risk management with control strategies aiming to reduce exposure as much as possible.
Control of Asbestos Regulations (CAR) 2012 (**Ref 17.11**)	Legislation to set out the duties to manage risks from asbestos/asbestos containing materials (ACM) 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 ACM that may be present.
Construction (Design & Management) Regulations (CDM), 2015 (**Ref 17.12**)	Legislation to ensure health and safety issues are properly considered during a project's development so that the risk of harm to those who have to build, use and maintain the development is reduced. CDM regulations apply to all building and construction work, including new build, demolition, refurbishment, extensions, conversions, repair and maintenance.
Guidance	

Policy / Legislation / Guidance	Description
Natural Environment Published January 2016, updated July 2019 (**Ref 17.13**)	Guidance that explains key issues in implementing policy to protect and enhance the natural environment, including local requirements.
Health and Safety Executive (HSE) (1991) Guidance Note HS(G)66, Protection of Workers, and the General Public during the Development of Contaminated Land (**Ref 17.14**)	Addresses the considerable hazards associated with contaminated land working and aspects which developers and contractors need to consider.
Environment Agency (EA) (2020 Updated April 2021) Land Contamination Risk Management (LCRM) (**Ref 17.15**)	Provides guidance on how to assess and manage the risks from land contamination.
Environment Agency and National House Building Council (NHBC) (2008) Guidance for the safe development of housing on land affected by contamination, Environment Agency R&D Publication 66 (**Ref 17.16**)	Guidance to assess how best to construct housing on land affected by contamination. Although published by the NHBC, the guidance provided is relevant to many types of development.
CIRIA C552 (2001), Contaminated Land Risk Assessment: A guide to good practice (**Ref 17.17**)	Provides guidance on the examination and risk assessment of contaminated land and provides an explanation of the key elements of risk assessment practices and procedures.
CIRIA C532 (2001) Control of Water Pollution from Construction Sites (**Ref 17.18**)	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.
BS 10175 (2011 +A2:2017) Investigation of Potentially Contaminated Sites – Code of Practice (**Ref 17.19**)	Provides recommendations for investigation of potentially contaminated land or land with naturally elevated concentrations of potentially harmful materials.
Department for Environment, Food and Rural Affairs (DEFRA), Contaminated Land Statutory Guidance April 2012 (**Ref 17.20**)	Provides statutory guidance on the processes involved in assessing contaminated.

Policy / Legislation / Guidance	Description
Environment Agency (2017) Groundwater Protection (**Ref 17.21**)	Contains position statements which provide information about the Environment Agency's approach to managing and protecting groundwater.
British Standards Institute (BSI) BS 5930 (2015 +A1:2020) The Code of Practice for Site Investigations. (**Ref 17.22**)	Provides guidelines for conducting ground investigation.
Design Manuals for Roads and Bridges (DMRB) 109 (Geology and Soils) (**Ref 17.23**)	A manual that covers the requirements that shall be applied to the assessment, reporting and management of environmental effects on geology and soils from the delivery of highways projects. Although the Proposed Scheme is not a highways project, this guidance is used in the absence of any other guidance specific to the topic of Geology and Soils.

17.3. STUDY AREA

17.3.1. The Proposed Scheme is an irregular shaped parcel of land lying approximately 3 to 6 metres above ordnance datum (m AOD).

17.3.2. This chapter covers land defined as the Site as shown in **Figure 1-1**. The Study Area for the Geology and Soils assessment includes the Site, plus the following buffers:

- A 50m buffer from the Proposed Scheme has been used in identifying sources of contamination posing a risk to human health receptors. Given there is no direct citing of a recommended buffer in industry guidance for the assessment of human health in relation to contaminated land, the 50m buffer used is determined on the basis of professional judgement and its acceptance on other schemes. A 50m buffer is the area that could be impacted in terms of Geology and Soils as a result of the Proposed Scheme and surrounding sensitive environmental receptors and contamination migration potential; and
- A 250m buffer from the Proposed Scheme has been used to identify sources of contamination posing a risk to sensitive controlled waters receptors (groundwater and surface water). This is consistent with safe development on contaminated land guidance document R&D66 (**Ref 17.16**) when considering the impacts of contamination on sensitive environmental receptors.

17.3.3. It is noted that the above buffers are based on human health and controlled waters receptors, additional sensitive receptors such as mineral resources are identified within **Section 17.5** of this chapter, however these additional receptors are specifically within the Site and do not require consideration within a buffer beyond the Site boundary.

17.3.4. This chapter has been prepared in accordance with the constructability information provided for the Proposed Scheme, as well as consideration of typical industry

operational measures to be adopted during the construction phase (i.e. around worker Health and Safety and protection from contamination etc.). It is assumed that the information provided and reviewed in the baseline is representative of existing ground conditions. A degree of professional judgement has been used in the interpretation of information and in determining the sensitivity and magnitude.

17.4. BASELINE CONDITIONS AND FUTURE BASELINE

METHOD OF BASELINE DATA COLLECTION

17.4.1. To inform the assessment of baseline conditions, a Phase 1 Preliminary Environmental Risk Assessment (Phase 1 PERA) (**Appendix 17-A**). This has been completed and comprises a review of the following publicly available data and data purchased from third parties, the key data sources are listed below:

- Groundsure Enviro + Geo Insight and Groundsure Insight Historical Ordnance Survey mapping (**Ref 17.24**)
- Zetica UXO Pre-Desk Study Assessment (April 2023) (**Ref 17.25**)
- British Geological Survey (BGS) Onshore GeoIndex online viewer[1]
- Coal Authority Interactive Map viewer[2]
- BGS 1:50,000 map, Sheet 33 Stockton Solid and Drift Geology (**Ref 17.26**)
- BGS 1:10,000 map, Sheet NZ52SW, Solid and Drift Geology (**Ref 17.27**)
- EA Catchment Data Explorer (**Ref 17.28**)
- DEFRA Magic Map website[3]
- Cranfield Soil and Agrifood Institute Soilscapes (**Ref 17.29**)

17.4.2. It is noted that at the time of writing, given access restrictions, a Site reconnaissance was not completed. The Phase 1 PERA (**Appendix 17-A**) is therefore completely desk based. It should be noted that the Phase 1 PERA has been prepared based on a previous iteration of the Site. Further explanation of the reasoning and implications of this is provided within the Phase 1 PERA.

BASELINE CONDITIONS

17.4.3. The following sections present a summary of the baseline conditions, further detail along with historical Ordnance Survey (OS) maps are provided within the Phase 1 PERA (**Appendix 17-A**).

[1] GeoIndex - British Geological Survey (bgs.ac.uk)
[2] Interactive Map Viewer | Coal Authority (bgs.ac.uk)
[3] MAGIC (defra.gov.uk)

Site History

The earliest historical mapping (around the mid-1800s) shows the Site was largely undeveloped mud flats. Development in the southern area began around the late 1800s with Salt and Iron Works and associated infrastructure. The Salt and Iron Works changed in size and layout over time and are shown to have been present until the 1950s at which time they were replaced with unspecified works and warehousing. A terminal is shown to have been constructed at the eastern extent of the Site, adjacent to the River Tees, in the 1980s and remains today. TV1/TV2 (for more information, see **Chapter 2: Site and Proposed Scheme Description**) were constructed in the last 10 years and also remain today. Associated infrastructure, such as roads and pipework, connect the various operational areas within the Site.

The surrounding land uses were also predominantly mud flats until the late 1800s when a small Salt Works was established to the northwest and a large Salt Works and Irons Works was established predominantly to the east, however partially within the Site. Several Brine Wells are noted in all directions from the Site from the late 1800s to the mid-1900s. The majority of these were off-site, but one was recorded within the north of Area 3 between 1897 and 1913. The Salt Works and Iron Works are shown to be present until the 1950s at which time they were replaced with a Coal Distillation Plant (now a Chemical Works). The smaller Salt Works to the northwest is now known as a Brine Field.

Soil Quality

17.4.4. The Proposed Scheme is within an area where the soil type is Loamy and clayey soils of coastal flats with naturally high groundwater (**Ref 17.29**).

Agricultural Land

17.4.5. The majority of the Site is classified as urban with a small area in the north west classified as Grade 5 (very poor quality) (**Ref: 17.29**).

Geological Designated and Non-Designated Features

17.4.6. An initial review suggests there are no potential Local Geological Sites (formerly referred to as Regionally Important Geological Sites (RIGS)) within the Site.

Published Geology

17.4.7. **Figures 17-1** to **17-3** illustrate the underlying geology and a summary is provided in **Table 17-2**.

Table 17-2 - Summary of Published Geology

Strata	Site Coverage	Description
Artificial Ground		
Made Ground	Majority of site and surrounding area to north south and east Artificial ground is shown to be absent along the western and north western pipeline corridor, to the west of the rail terminal and the southern extent of the western wharf (Wilton Engineering Wharf)	n/a
Superficial Deposits		
Tidal Flat Deposits (formerly Estuarine and Marine Alluvium)	Entire site	Sand and silt
Bedrock		
Mercia Mudstone Group (MMG)	Majority of the Site	Brown and red-brown, calcareous clays and mudstones, with occasional beds of impersistent green siltstone and fine-grained sandstone
Sherwood Sandstone Group (SSG)	Access road along the western section of the site	Sandstone, red, yellow and brown, part pebbly; conglomeratic in lower part

17.4.8. The Saltholme Fault runs along the northern section of the Site, trending east west with a downthrow to the north.

17.4.9. The Site does not lie within a Coal Authority Coal Mining Reporting Area.

Hydrogeology

17.4.10. A summary of the aquifer classifications (from Environment Agency data) is provided in **Table 17-3**.

Table 17-3 - Hydrogeological Summary

Strata	Site Area	Aquifer Classification	Groundwater Vulnerability
Superficial Deposits			
Tidal Flat Deposits	Entire Site	Secondary Undifferentiated Aquifer	High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits
Bedrock			
Mercia Mudstone Group (MMG)	Majority of the Site	Secondary B Aquifer	High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits
Sherwood Sandstone Group (SSG)	Access road along the western section of the site	Principal Aquifer	

17.4.11. The Site does not lie in a groundwater source protection zone (SPZ).

17.4.12. There is one active groundwater abstraction within the Site and two within 250m of the Site, all of which are stated to be for general use.

17.4.13. The nearest active potable abstraction borehole is recorded 647m southwest of the Port Clarence area of the Site, and to the south of the River Tees; the abstraction is for drinking water, abstracted from the SSG.

17.4.14. A Brine Field is situated to the northwest of the Site, with the potential for large-scale abstractions.

17.4.15. The water framework directive (WFD) (**Ref 17.7**) classifies the SSG as having a good chemical and overall rating and the MMG as having a poor chemical and overall rating. Further details pertaining to the groundwater quality are provided in **Chapter 9: Water Environment and Flood Risk.**

Hydrology

17.4.16. Several unnamed lakes and inland rivers are recorded in the Groundsure report for the site (which in turn is based on Environment Agency and Ordnance Survey data) within and immediately adjacent to the Site. The Site borders the River Tees to the southeast and south with part of the Site covering Jetties to the east and Wharfs to the south-west (see **Figure 1-2**). The River Tees is classified under the WFD as chemical rating (fail), an ecological rating (moderate) with an overall rating of moderate. Further details are provided in **Chapter 9: Water Environment and Flood Risk**.

Mining, Ground Workings and Natural Cavities

17.4.17. The Phase 1 PERA (**Appendix 17-A**) indicates the Site does not lie within a Coal Mining Report Area. Therefore, there is no further consideration of risks associated with coal mining.

17.4.18. The following mining, ground workings or natural cavity related features are recorded on, or within 250m of the Site.

- One Brine Well recorded 133m southwest of the Site, ceased operation;
- Surface ground working (multiple refuse heaps, unspecified pits, ponds and water bodies) on, and within 250m of, the Site;
- Underground workings being two tunnels recorded on the Site;
- A historical mineral planning area for surface mineral working of salt on the Site;
- Non-coal mining related underground workings for brine. Multiple records on, and within 250m of, the Site; and
- Mining cavities comprising abandoned mineral workings and possible surface instability problems. One recorded on the Site and seven within 250m of the Site.

Mineral Resources

17.4.19. The Tees Valley Core Strategy (**Ref 17.30**) includes plans for Mineral Safeguarding Areas. Whilst the Strategy indicates there are no shallow reserves of coal, sand and gravel, and limestone, there are deep reserves of gypsum and salt located within and surrounding the Proposes Scheme's study area. It is noted that these reserves are shown to be present across the majority of the area covered in the Tees Valley Core Strategy.

Environmental Designated Sites

17.4.20. The Teesmouth and Cleveland Coast (within the Site) is classified as a SSSI, a Conserved Wetland Site (Ramsar) and a Special Protection Area (SPA).

17.4.21. There are no geological important designated SSSIs on or within 250m of the Site.

Landfills and Waste Management

17.4.22. The Phase 1 PERA (**Appendix 17-A**) reports five active landfills and seven historical landfills on, or within, 250m of the Site. It also reports nine active waste management sites within the Site and a further twenty-four within 250m of the Site.

Unexploded Ordnance (UXO)

17.4.23. The Phase 1 PERA (**Appendix 17-A**) reports that a Zetica UXO Pre-Desk Study Assessment (PDSA) (dated 14 April 2023) recorded strategic World War I (WWI) and World War II (WWII) targets within the Site and records indicate several high explosive bombs fell in close proximity.

Potential Sources of Contamination

17.4.24. The following relevant potential contamination sources have been identified in consideration of the Site's previous industrial use:

- Contaminants within Made Ground material associated with previous on-Site uses (potentially including asbestos and chemical contaminants such as metals, polyaromatic hydrocarbons, petroleum hydrocarbons, volatile and semi-volatile organic compounds);
- Contaminants within shallow soils / shallow bedrock related to previous Site uses of an industrial nature and relating to adjacent site uses (the same potential chemical contaminants as above);
- Hazardous Ground Gas associated with potential Made Ground and the infilling of reservoirs or organic deposits; and
- Hazardous vapours associated with volatile contamination within soil and/or groundwater.

17.4.25. In consideration of the operational phase of the Proposed Scheme, notable areas of potential contamination sources include bulk liquid storage facilities (which will include existing facilities that are likely to be expanded) as well as liquid transfer pipelines and pipe connections.

Potential Contaminant Pathways

17.4.26. Based on the initial Conceptual Site Model presented in the Phase 1 PERA (**Appendix 17-A**), relevant potential pathways are considered to include the following:

- Direct contact, ingestion and inhalation of soil bound contaminants/dust;
- Migration of hazardous ground gas (relating to Made Ground or infilled basin/reservoirs) / vapours (relating to soil or groundwater contaminant sources) into any deeper excavations (if proposed i.e., to install deeper drainage manhole chambers) during construction causing asphyxiation or explosion and migration into the future buildings if left untreated; and

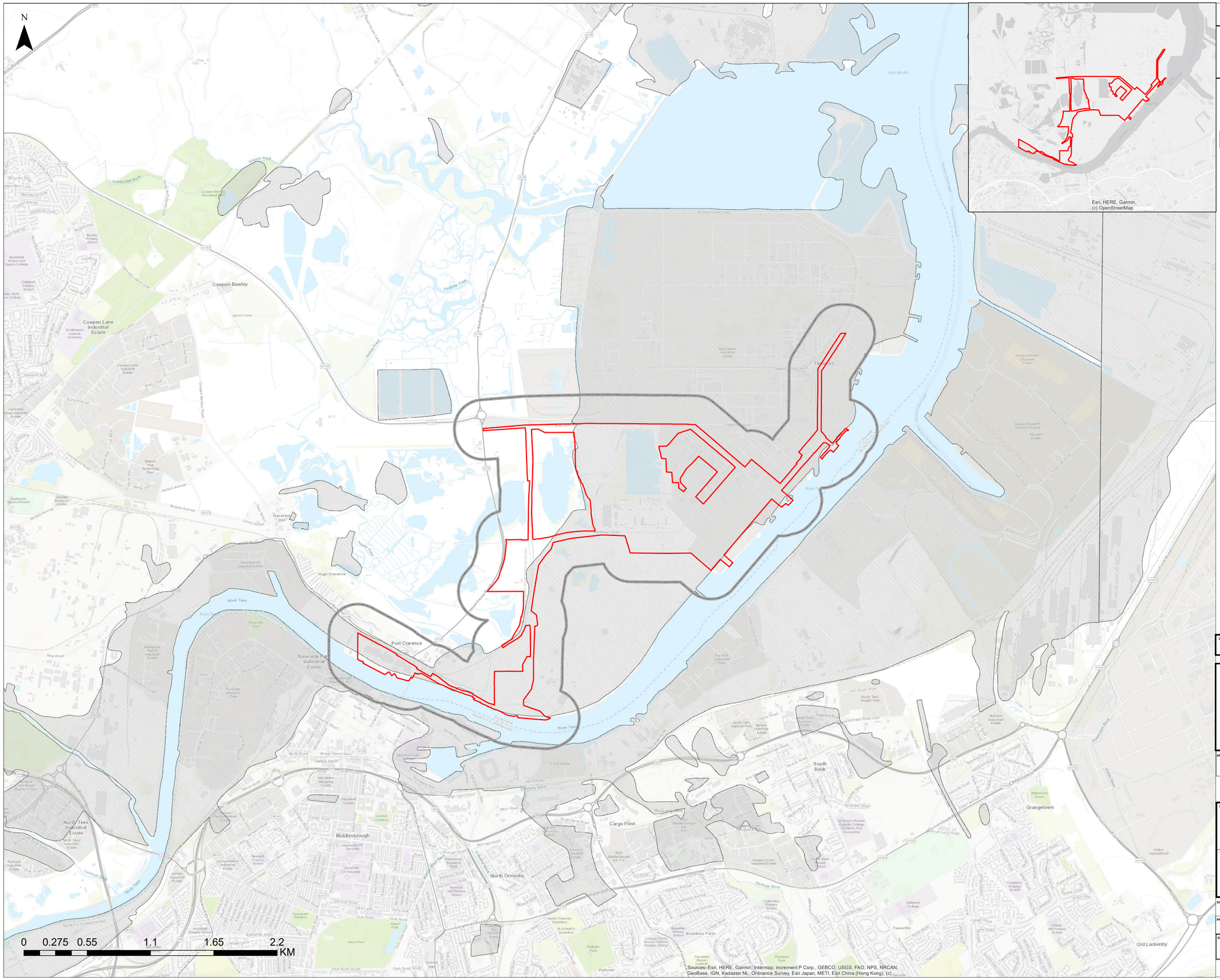
- Migration of mobile contaminants into superficial and bedrock aquifers and/or the River Tees.

17.4.27. Confirmation of the nature and extent of impact to receptors via these pathways would require ground investigation, plus testing and assessment of contaminant concentrations in soil, water, gas and vapour phases. These pathways are potentially more plausible during the construction phase, but could also be relevant during the operational phase dependent on the nature of the developed site (i.e. foundation types, presence of areas of soft landscaping etc.). It is anticipated that the potential for impacts in both the construction and operational phases could be readily mitigated through typical health and safety and site remediation activities (if needed).

FUTURE BASELINE

17.4.28. In a future baseline, and in the absence of the Proposed Scheme, it is considered that the land use within the development study area will either remain in its current state (as a variable combination of existing operational facilities, existing constructed but non-operational facilities and areas of vacant land) or undergo redevelopment of different industrial nature.

17.4.29. With respect to Geology and Soils aspects considered within this Chapter, the future baseline is anticipated to remain largely unchanged unless there are significant earthworks completed as part of any future redevelopment. It is anticipated that should the Site remain in its current condition there will be a continued presence on Site to monitor the integrity of the non-operational infrastructure (the TV1 and TV2 sites) and ensure the operational aspects continue operating within their permitting requirements in order to minimise the potential for pollution incidents which may alter the future baseline.



DO NOT SCALE

Information Classification:

PUBLIC

Information that is available to the general public and is intended for distrubution outside WSP.

Key

- Proposed DCO Application Boundary
- 250m Buffer
- Made Ground (Undivided) – Artificial Deposit

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

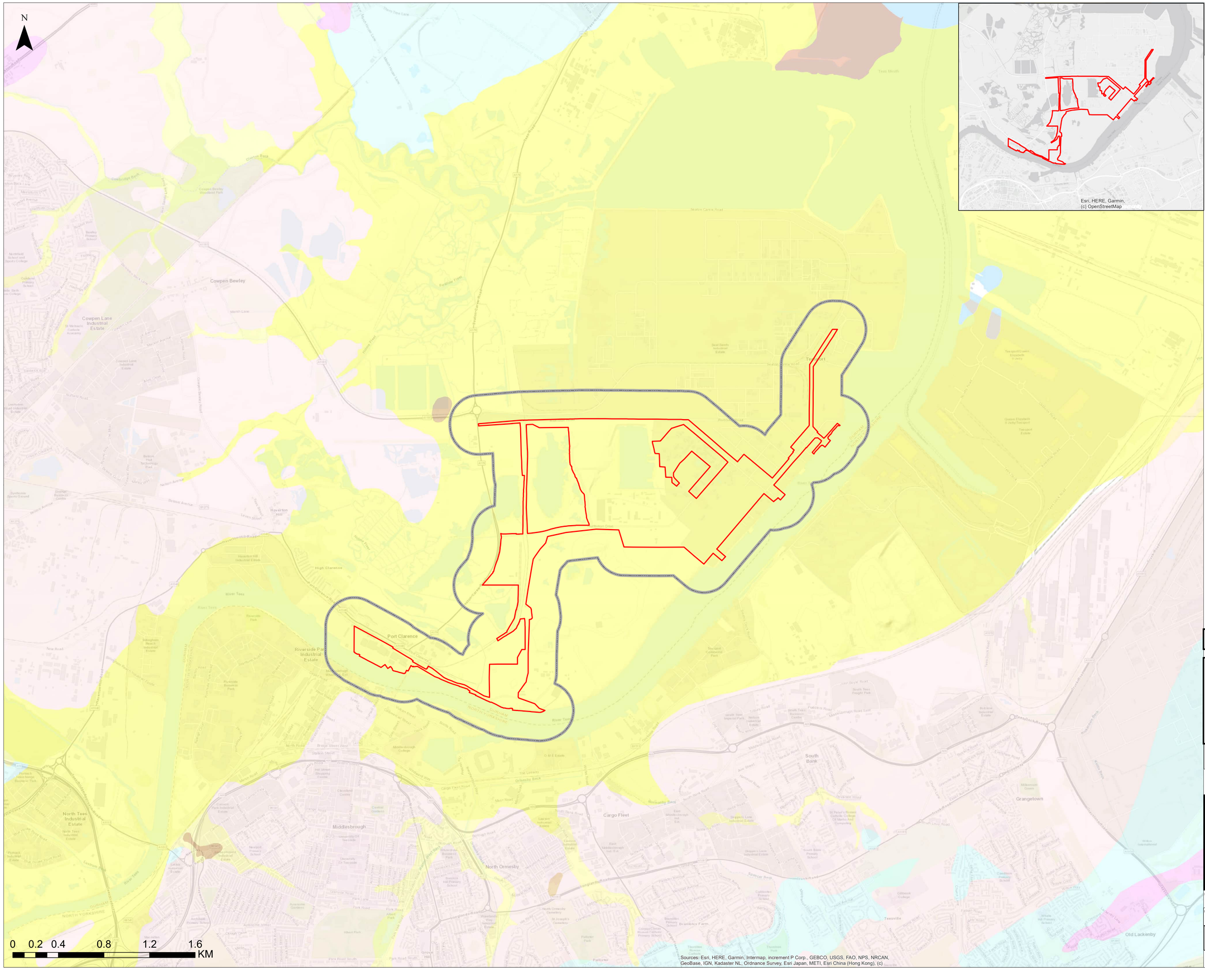
APPLICANT: Lighthouse Green Fuels Ltd.

PROJECT: Lighthouse Green Fuels

TITLE: Figure 17-1 Artificial Ground

SCALE @ A1:	CHECKER:		APPROVER:
1:15000	MW		JG
PROJECT No:	DESIGNER:	DRAWN:	DATE:
70102442	SC	AV	19/07/2023

DRAWING No: 70102442-WSP-RP-ES-1701 REV: R-2



Information Classification:

PUBLIC

Information that is available to the general public and is intended for distrubution outside WSP.

Key

- Proposed DCO Application Boundary
- 250m Buffer

BGS Geology: Superficial Deposits

- Glaciofluvial Deposits, Devensian – Sand and Gravel
- Till, Devensian - Diamicton
- Glaciolacustrine Deposits, Devensian - Sand
- Tidal Flat Deposits – Sand and Silt
- Beach and Tidal Flat Deposits (Undifferentiated) - Sand
- Peat - Peat
- Lacustrine Deposits – Clay and Silt

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

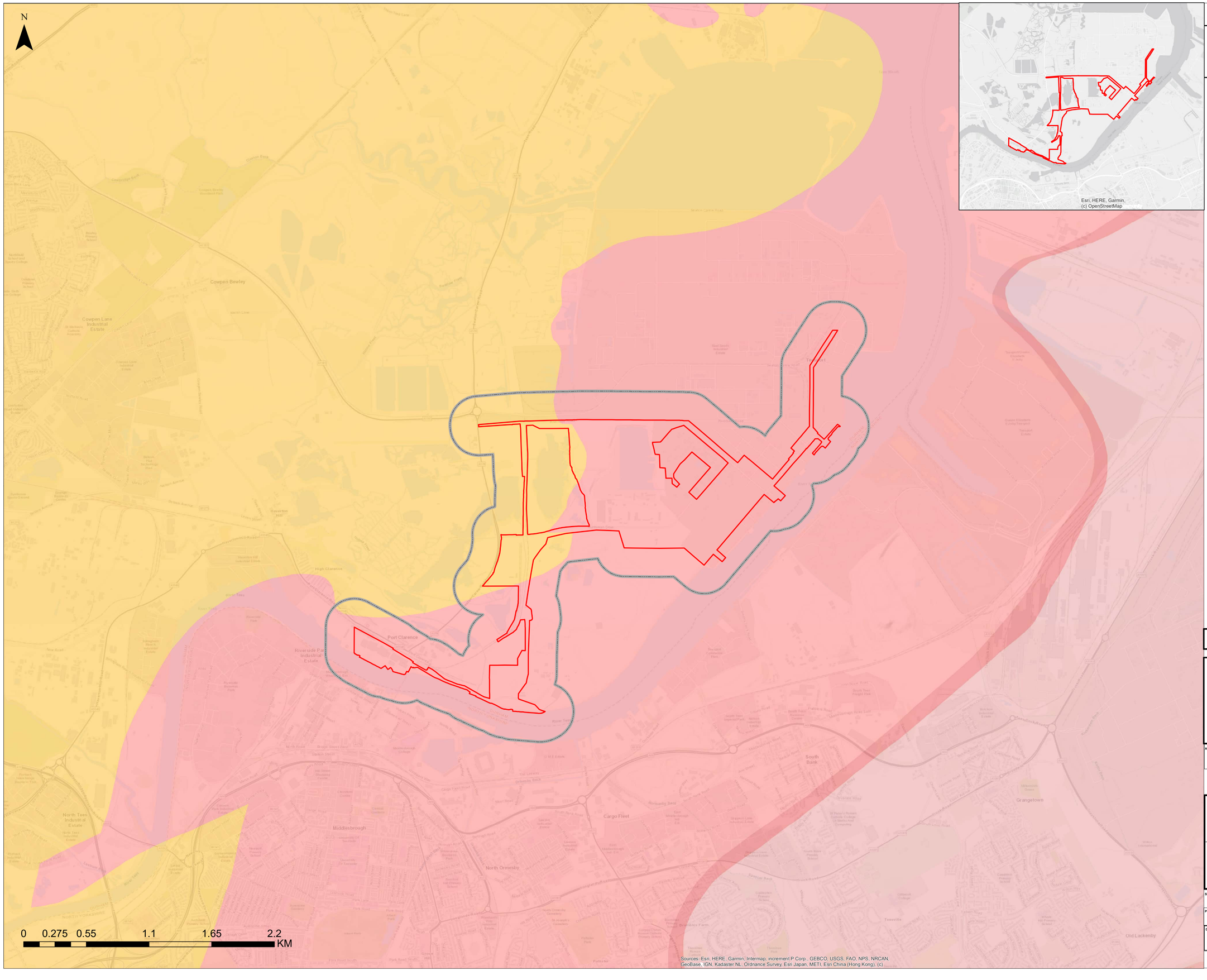
APPLICANT: Lighthouse Green Fuels Ltd.

PROJECT: Lighthouse Green Fuels

TITLE: Figure 17.2: Superficial Deposits

SCALE @ A1:	CHECKER:		APPROVER:
1:50000	MW		JG
PROJECT No:	DESIGNER:	DRAWN:	DATE:
70102442	ES	AV	13/07/2023

DRAWING No:	REV:
70102442-WSP-RP-ES-1702	R-2



DO NOT SCALE

Information Classification:

PUBLIC

Information that is available to the general public and is intended for distrubution outside WSP.

Key

- Proposed DCO Application Boundary
- 250m Buffer
- Sherwood Sandstone Group - Sandstone
- Mercia Mudstone Group - Mudstone
- Penarth Group - Mudstone
- Redcar Mudstone Formation - Mudstone

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

APPLICANT: Lighthouse Green Fuels Ltd.

PROJECT: Lighthouse Green Fuels

TITLE: Figure 17-3 Bedrock Geology

SCALE @ A1:	CHECKER:		APPROVER:
1:15000	MW		JG
PROJECT No:	**DESIGNER:**	**DRAWN:**	**DATE:**
70102442	SC	AV	19/07/2023

DRAWING No:	REV:
70102442-WSP-RP-ES-1703	R-2

17.5. SENSITIVE RECEPTORS

17.5.1. Based on the initial Conceptual Site Model presented in the Phase 1 PERA (**Appendix 17-A**), relevant potential receptors are considered to include the following:

- Construction workers during the development and / or future maintenance workers;
- Future Site users;
- Neighbouring users of existing operational facilities during the development (e.g. Teesside Biomass and Industrial Chemicals Ltd to the south of the Site, users of the jetties to the east of the Site, and Billingham Fire Station to the north west of the Site).
- Third parties during and after the development (e.g. visitors to the nature reserve to the west of the Site);
- Mineral resources (underlying reserves of gypsum and salt);
- Groundwater in superficial deposits (Secondary Undifferentiated Aquifer) and bedrock (Secondary B and Principal Aquifer); and
- Surface waters (River Tees).

17.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

17.6.1. At this early stage of the Proposed Scheme's design (for more information on the current design and alternatives which have been considered, see **Chapter 2: Site and Proposed Scheme Description**), details on embedded mitigation measures in place at Construction Phase are not available. However, industry standard embedded mitigation measures for inclusion in the DCO are recommended in the Phase 1 PERA (**Appendix 17-A**). These are as follows:

- Completion of a detailed desk study to ascertain the UXO risk at the Site, and to potentially zone the Site prior to investigation delivered by way of Site-specific UXO report);
- An intrusive investigation to refine the CSM and geotechnical soil parameters, and to further understand the hydrogeological regime (described within an interpretative ground investigation report);
- Installation of gas / vapour and groundwater monitoring wells (described within an interpretative ground investigation report);
- Classification of waste soils, to satisfy the EA, land contamination officers and planners (described within an interpretative ground investigation report);
- Identification of remediation requirements, and likely timescales for remediation to aid development of the construction programme (described within a Remediation Strategy); and

- Identification of likely long term monitoring requirements that will be required as part of the environmental permit for the proposed scheme (likely described within a Remediation Strategy and / or Verification Report).

CONSTRUCTION PHASE

17.6.2. It is anticipated that the appropriate secondary mitigation measures, including but not limited to the following, will be included in the Code of Construction Practice (CoCP) which will be secured as part of the DCO requirements:

- Earthworks would be completed in accordance with a Contaminated Land: Applications in Real Environments (CL:AIRE) compliant Materials Management Plan (MMP) to ensure re-used material does not present a risk to human health or the environment and complies with UK waste legislation regulations;
- Incorporation of a temporary surface water drainage strategy to limit any contaminated run-off entering surrounding surface watercourses;
- Subject to the findings of future intrusive ground investigation (likely a requirement of the Local Planning Authority, Stockton-on-Tees Borough Council), a suitable remediation strategy will be formulated and agreed with the Local Planning Authority prior to being implemented to mitigate unacceptable contaminated land related risks in the context of the Proposed Scheme;
- Any activities completed as part of the construction phase which have the potential to promote potential contaminant migration pathways to the underlying aquifers, for example piling, will be completed following an appropriate risk assessment and completed in accordance with appropriate Risk Assessments and Method Statements (RAMS).
- Appropriate measures to limit release of contaminants to the ground from construction related activities (e.g. use of plant/machinery and storage of materials) to be incorporated within a CoCP.

OPERATION PHASE

17.6.3. It is anticipated that mitigation measures will be inherent in the design of the future facility and the future operations will be undertaken in line with the appropriate environmental permitting requirements with particular reference to The Environmental Permitting (England and Wales) Regulations 2016 (**Ref 17.9**).

17.6.4. To mitigate any potential operational effects, the drainage design for the Proposed Scheme will require consideration of measures to prevent contamination from migrating toward sensitive surface watercourses and underlying aquifers.

17.6.5. All storage and loading / unloading areas will be adequately bunded.

17.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

17.7.1. Based on our understanding of the proposed project, the findings of the Phase 1 PERA (**Appendix 17-A**) and experience from other similar schemes, potentially likely significant effects as outlined below.

17.7.2. The likely significant effects associated with the Construction Phase will relate to:

- Exposing construction staff to contaminated dust and soil particulates during construction related earthworks activities (specific receptors include construction workers during development);
- Mobilising existing contamination in soils and groundwater as a result of ground disturbance and de-watering and creating preferential migration pathways for contaminants to reach sensitive receptors (e.g. as a result of piling or along new service trenches). Specific receptors include construction workers, neighbouring users of existing operational facilities, mineral resources, groundwater and surface watercourses;
- Introduction of new sources of contamination to the ground, such as fuels and oils used in construction plant, associated with any spillages and leaks. Specific receptors include construction staff, neighbouring users of existing operational facilities, mineral resources, groundwater and surface watercourses; and
- Release of hazardous gas and subsequent accumulation within confined spaces associated with disturbing organic soils or infilled areas of land. Specific receptors include construction workers during development.

OPERATION PHASE

17.7.3. The likely significant effects associated with the Operation Phase will relate to:

- Damage to structures and infrastructure from ground contaminants. Specific receptors include foundations and other buried structural components, belowground pipework, etc); and
- Introduction of new sources of contamination to the ground as a result of potential spills, leaks and uncontrolled discharge of potential pollutants during the operation phase. Specific receptors include construction workers during operation, and controlled waters.

ELEMENTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

Table 17-4 - Elements Scoped in or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Contaminated soil and detriment to Human Health	Construction		✔	Potential for construction staff (and possibly the general public) to be exposed to contaminants in the ground (particularly in areas currently or formerly used for industrial purposes). This risk to human health will be mitigated through robust risk assessments and method statements (RAMS) which are standard practice during any construction stage. The future intrusive investigation can be used to determine the areas of contamination that can then be used to inform the RAMS.
	Operation		✔	Contaminated land pathways to human health to be addressed via a Remediation Strategy and incorporated as part of the construction phase, thereby leaving the Site 'suitable for use' from a contaminated land perspective as part of the operational phase.
Controlled Water Body Contamination (including Ramsar and SSSI sites)	Construction		✔	Potential for contaminants to be mobilised and impact sensitive controlled water receptors. Potential sources of contamination and understanding of the hydrogeological regime will be acquired through future Site investigation. The requirement for the implementation of standard practices during construction to minimise the potential for release of contaminants to the environment will be included within the CoCP.
	Operation		✔	No contaminated land source-pathway-receptors linkage identified as part of the operational phase. The facility will be operated in accordance with the environmental permitting requirements.
Hazardous Ground Gas to accumulate within confined spaces	Construction and Operation		✔	Potential for works to create additional pathways to allow hazardous gas (e.g., methane and carbon dioxide) to accumulate within underground chambers / pipeline runs or pipeline support infrastructure, or to migrate towards buildings will be assessed during future ground investigation and

Element	Phase	Scoped In	Scoped Out	Justification
				mitigated through standard construction practices and implementation of good design. Construction works will be completed in accordance with the CoCP which will include the requirement for construction activities to be completed in accordance with relevant RAMS and consideration of working in confined spaces. If confined spaces or other areas where gas could accumulate are included in the Proposed Scheme, the construction of these could include gas protection measures where necessary, and / or appropriate entry and use controls.
Built Environment – detriment of pipes and cables from aggressive ground contaminants over time.	Construction Operation		✔ ✔	Discounted from the construction phase as insufficient time for contaminants to impact structures, pipe/ducting materials during the construction phase of the Proposed Scheme. Potential for aggressive ground conditions to affect inground structures. Contaminants in the ground to impact (damage) pipe and cable material over time will be assessed during future intrusive works and mitigated through implementation of good design.
Agricultural Soils	Construction and Operation		✔	Agricultural soils have been discounted from further assessment as they have not been identified to be a sensitive receptor. The majority of the Site has an agricultural classification of 'urban' with a small area of the northwest corner being classed as Grade 5 (very poor quality) and therefore of negligible sensitivity.
Mineral Resources	Construction and Operation		✔	Mineral resources have been discounted from further assessment as it is considered that they are already sterilised both within the Site by the existing development and also within the wider surrounding area by the existing surrounding industries. It is also noted that the deep reserves of gypsum and salt are shown across a significant area of Tees Valley and that sterilisation of the reserves beneath the Site would represent sterilisation of significantly <1% of the overall mineral resource.

17.8. PROPOSED ASSESSMENT METHODOLOGY

17.8.1. As Geology and Soils will be scoped out of the EIA, no further desk-based or impact assessment is required.

17.9. LIMITATIONS AND ASSUMPTIONS

17.9.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- In preparing the Geology and Soils scoping chapter, a key assumption has been that ground investigation will be a requirement for and undertaken to inform detailed design of the proposed facility;
- It has been assumed that all construction works and the operation of the proposed facility will be completed in accordance with standard environmental practices and under the planning regime;
- It has been assumed that the construction phase will be completed in accordance with the requirements of a CoCP which will include as a minimum the requirement for the construction phase to be completed in line with appropriate RAMS which will be prepared in line with the requirements of standard environmental practices and guidance; and
- At the time of writing, there has been no consultation with statutory consultees. Any commentary associated with the scoping report will be addressed as required.

17.10. REFERENCES

Ref 17.1: Ministry of Housing, Communities and Local Government (2021). The National Planning Policy Framework. Available at: National Planning Policy Framework - GOV.UK (www.gov.uk)

Ref 17.2: Department of Energy and Climate Change (2011). Overarching National Policy Statement for Energy 2011 (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: Department for Energy Security and Net Zero (2023) Draft Overarching National Policy Statement for Energy 2023 (EN-1). Available at: Planning for new energy infrastructure: revisions to National Policy Statements - GOV.UK (www.gov.uk)

Ref 17.4: Stockton on Tees Borough Council (2019) Local Plan. Available at: Local Plan - Stockton-on-Tees Borough Council

Ref 17.5: UK Government (1990) Environmental Protection Act, 1990. Available at: https://www.legislation.gov.uk/ukpga/1990/43/part/IIA

Ref 17.6: UK Government (2012) Contaminated Land Regulations (England) 2006. Available at: The Contaminated Land (England) (Amendment) Regulations 2012 (legislation.gov.uk)

Ref 17.7: UK Government (2017) The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Available at: The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (legislation.gov.uk)

Ref 17.8: UK Government (2015) Environmental Damage (Prevention and Remediation) (England) Regulations 2015. Available at: The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 (legislation.gov.uk)

Ref 17.9: UK Government (2016) The Environmental Permitting (England and Wales) Regulations 2016. Available at: The Environmental Permitting (England and Wales) Regulations 2016 (legislation.gov.uk)

Ref 17.10: Health and Safety Executive (2002). Control of Substance Hazardous to Health Regulations (COSHH) 2002. Available at: The Control of Substances Hazardous to Health Regulations 2002 (legislation.gov.uk)

Ref 17.11: Health and Safety Executive (2012). Control of Asbestos Regulations (CAR) 2012. Available at: Control of Asbestos Regulations 2012 (hse.gov.uk)

Ref 17.12: UK Government (2015) Construction (Design & Management) Regulations (CDM), 2015. Available at: Construction - Construction Design and Management Regulations 2015 (hse.gov.uk).

Ref 17.13: Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government (2016) Natural Environment. Available at https://www.gov.uk/guidance/natural-environment

Ref 17.14: Health and Safety Executive (1991) Guidance Note HS(G)66, Protection of Workers, and the General Public during the Development of Contaminated Land. Available at: Managing for health and safety (HSG65) (hse.gov.uk)

Ref 17.15: Environment Agency (EA) (2021) Land Contamination Risk Management (LCRM). Available at: Land contamination risk management (LCRM) - GOV.UK (www.gov.uk)

Ref 17.16: Environment Agency and National House Building Council (NHBC) (2008) Guidance for the safe development of housing on land affected by contamination, Environment Agency R&D Publication 66. Available at: R&D66 VOL 1 Guidance for the Safe Development of Housing on Land Affected by Contamination (nhbc.co.uk)

Ref 17.17: CIRIA C552 (2001), Contaminated Land Risk Assessment: A guide to good practice. Available at: Item Detail (ciria.org)

Ref 17.18: CIRIA C532 (2001) Control of Pollution from Construction Sites. Available at: Item Detail (ciria.org)

Ref 17.19: BS 10175 (2011) Investigation of Potentially Contaminated Sites – Code of Practice. Available at: https://standardsdevelopment.bsigroup.com/projects/2017-02021

Ref 17.20: Department for Environment, Food and Rural Affairs (DEFRA) (2012) Contaminated Land Statutory Guidance. Available at: Contaminated land statutory guidance - GOV.UK (www.gov.uk)

Ref 17.21: Environment Agency (2017) Groundwater Protection. Available at: Groundwater protection position statements - GOV.UK (www.gov.uk).

Ref 17.22: British Standards Institute (BSI) BS 5930 (2020) The Code of Practice for Site Investigations. Available at: Code of practice for ground investigations has been updated | BSI (bsigroup.com)

Ref 17.23: Design Manuals for Roads and Bridges (DMRB) 109 (Geology and Soils). Available at: LA 109 - Geology and soils (standardsforhighways.co.uk)

Ref 17.24: Groundsure Enviro+Geo Insight Reference GSIP-2023-13564-13638, April 2023.

Ref 17.25: Zetica UXO Pre-Desk Study Assessment (April 2023). Available in **Appendix 17-A**.

Ref 17.26: BGS 1:50,000 map, Sheet 33 Stockton Solid and Drift Geology

Ref 17.27: BGS 1:10,000 map, Sheet NZ52SW, Solid and Drift Geology

Ref 17.28: EA Catchment Data Explorer. Available at: England | Catchment Data Explorer

Ref 17.29: Cranfield Soil and Agrifood Institute Soilscapes. Available at: Soilscapes soil types viewer - Cranfield Environment Centre. Cranfield University (landis.org.uk)

Ref 17.30: Tees Valley (2011) Joint Minerals and waste Development Plan Core Strategy. Available at https://www.stockton.gov.uk/minerals-waste

18. TRAFFIC AND TRANSPORT

18.1. INTRODUCTION

18.1.1. This chapter considers the impacts of the Proposed Scheme on Traffic and Transport during construction and operation, and any potential significant effects. It sets out the proposed methodology for the Traffic and Transportation assessment and identifies those impacts that can be scoped in or out of the Environmental Impact Assessment (EIA).

18.1.2. The impacts of the Proposed Scheme on Marine Navigation are considered in **Chapter 20: Marine Navigation**.

18.2. POLICY, LEGISLATION AND GUIDANCE

18.2.1. The policy, legislation, and guidance relevant to the Traffic and Transport assessment of the Proposed Scheme is as follows:

Table 18-1 – Traffic and Transport – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement for Energy (EN-1) 2011 (**Ref 18.1**)	The Overarching National Policy Statement (NPS) for Energy (EN-1) explains the assessment principles to which the IPC (now the SoS) will have regard in the examination of energy NSIPs (such as the Proposed Scheme), and explains the generic traffic and transport impacts with regard to energy infrastructure.
Draft Overarching National Policy Statement for Energy (EN-1) 2023 (**Ref 18.2**)	A draft version of NPS EN-1 has been published for consultation in March 2023. This draft version includes considerations for assessment of traffic and transport impacts associated with the transport of materials, goods and personnel to and from a development during all project phases. The draft NPS EN-1 is similar in content to the current NPS EN-1 in relation to the consideration of traffic and transport impacts, approach to mitigation, and decision making by the SoS.
National Planning Policy Framework (NPPF) 2021 (**Ref 18.3**)	The National Planning Policy Framework (NPPF) replaced the previous Planning Policy Statements and Planning Policy Guidance used to determine planning applications under the Town and Country Planning Act 1990.

Policy / Legislation / Guidance	Description
	The document states the need for a Transport Statement (TS) or Transport Assessment (TA) to support developments likely to generate significant numbers of trips. It suggests that development should take advantage of opportunities for sustainable travel, facilitated by a Travel Plan (TP).
Department for Transport Circular 01/2022 Strategic road network and the delivery of sustainable development (2022) (**Ref 18.4**)	Department for Transport (DfT) Circular 01/2022 explains how National Highways will engage with the planning system and fulfil its remit to be a delivery partner for sustainable economic growth whilst maintaining, managing and operating a safe and efficient Strategic Road Network (SRN).
Highways England Water Preferred Policy (2019) (**Ref 18.5**)	This policy provides guidance on when to move an Abnormal Indivisible Load (AIL) by water and when it is allowed to be moved by road.
Tees Valley Joint Minerals and Waste Development Plan Document (2011) (**Ref 18.6**)	The Minerals and Waste Core Strategy contains the long-term spatial vision and strategic policies needed to achieve the key objectives for minerals and waste developments in the Tees Valley.
Tees Valley Strategic Transport Plan (2020) (**Ref 18.7**)	The Tees Valley Strategic Transport Plan is a comprehensive plan outlining the long-term transportation strategies and infrastructure improvements for the Tees Valley region. It aims to improve connectivity, support economic growth, and promote sustainable travel across the area.
Stockton-on-Tees Borough Council Local Plan (2019) (**Ref 18.8**)	The Local Plan sets out the Council's policies and proposals to guide planning decisions and establishes the framework for the sustainable economic growth and development of the Borough up to 2032. The Local Plan covers a range of matters including the number of new homes that are needed and where they should be located; the amount and proposed location of new employment land; protection and enhancement of the natural and historic environment; provision of new infrastructure and improvement of town centres and community facilities in the Borough.
Legislation	
The Highways Act 1980 (**Ref 18.9**)	The Highways Act 1980 sets out the requirements pertaining to delivering highways infrastructure, managing existing highways and managing highway

Policy / Legislation / Guidance	Description
	activity including off site highway works, for example, the creation of temporary site access.
Town and Country Planning Act 1990 (**Ref 18.10**)	The Town and County Planning Act 1990 provides the legal framework for the town and country planning system in England and Wales.
New Roads and Street Works Act 1991 (**Ref 18.11**)	The New Roads and Street Works Act 1991 provides a legislative framework for street works by undertakers and works for road purposes to the extent that these must be co-ordinated by street authorities.
Traffic Management Act 2004 (**Ref 18.12**)	The Traffic Management Act 2004 provides powers to tackle congestion and disruption on the road network and requires local authorities, where possible, to ensure that traffic can move quickly and freely on their roads.
The Planning Act 2008 (**Ref 18.13**)	The Planning Act 2008 created a new development consent regime for major infrastructure projects in the fields of energy, transport, water, waste water, and waste. It was intended to speed up the process for approving major new infrastructure projects.
Local Transport Act 2008 (**Ref 18.14**)	The Local Transport Act 2008 intended to address increasing road congestion and to improve the quality of local bus services and placed a requirement on authorities to prepare a Local Transport Plan.
Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (**Ref 18.15**)	The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 is UK legislation that sets out the requirements for assessing and mitigating the environmental impacts of major infrastructure projects. The regulations require developers to prepare an EIA and consult with stakeholders and the public. The aim of the regulations is to ensure that the environmental impacts of major projects are fully assessed and addressed, and that sustainable development principles are followed.
Guidance	
Guidelines for the Environmental Assessment of Road Traffic (1993) (**Ref 18.16**)	Known as ‘the IEMA Guidelines’. This guidance provides a basis for a comprehensive and consistent approach to the appraisal of traffic and transport impacts.

Policy / Legislation / Guidance	Description
Planning Practice Guidance Travel Plans, Transport Assessments and Statements (2014) (**Ref 18.17**)	This PPG was published in March 2014. Together, PPGs and the NPPF set out what the Government expects of local authorities. The overall aim is to ensure the planning system allows land to be used for new homes and jobs, while protecting valuable natural and historic environments. The guidance includes specific details in relation to the preparation of a TA, TS and TP.
LA 101 - Introduction to environmental assessment (2019) (**Ref 18.18**)	This document sets out the over-arching requirements and principles that form an introduction to the environmental assessment of motorway and all-purpose trunk roads.
LA 103 - Scoping projects for environmental assessment (2020) (**Ref 18.19**)	This document sets out the requirements for scoping motorway and all-purpose trunk road projects for environmental assessment.
LA 104 - Environmental assessment and monitoring (Highways England, 2020) (**Ref 18.20**)	This document sets out the requirements for environmental assessment of projects, including reporting and monitoring of significant adverse environmental effects.
LA 112 - Population and Human Health, Design Manual for Roads and Bridges (2020) (**Ref 18.21**)	This document sets out the requirements for assessing and reporting the environmental effects on population and health from construction, operation and maintenance of highways projects.

18.3. STUDY AREA

18.3.1. The Traffic and Transport Study Area is primarily based upon 'Rule 1' and 'Rule 2' of the IEMA Guidelines which can be used to determine the effect of increased traffic volumes on links within the Study Area, as described below:

- Rule 1 - Include highway links where traffic flows (or HGV flows) are predicted to increase by more than 30%; and
- Rule 2 - Include any other specifically sensitive areas where traffic flows (or HGV flows) are predicted to increase by 10% or more.

18.3.2. The extent of the Study Area has been defined by traffic associated with the construction phase of the Proposed Scheme, given that traffic and transport impacts are predicted to be greater during the construction phase than the operational phase. Further details on the anticipated number of workers and HGV movements during the operational phase are provided in **Section 18.8** in the context of the sites extant planning permission.

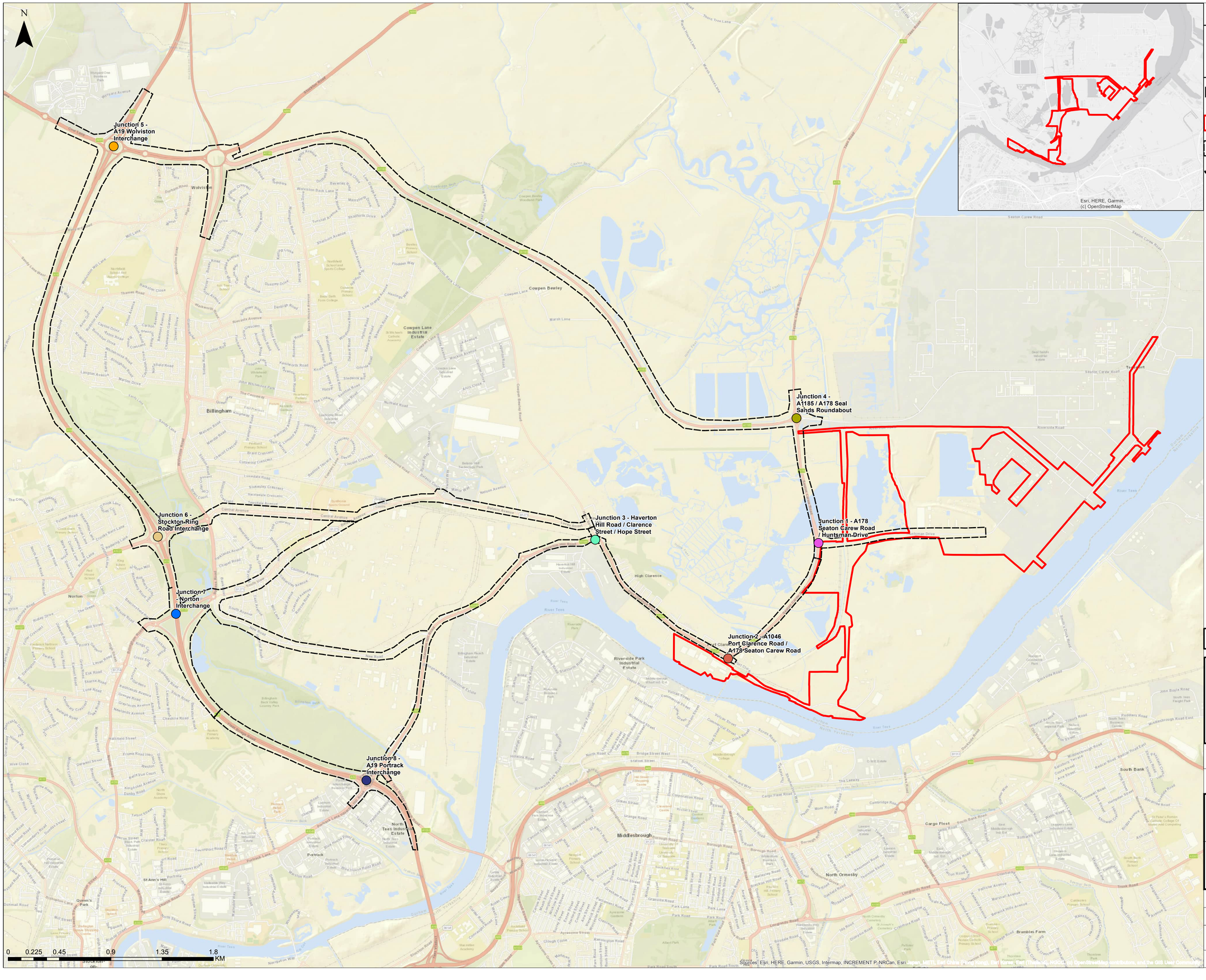
18.3.3. The Traffic and Transport Study Area is shown on **Figure 18-1** and comprises the following junctions and connecting highway links:

- A178 Seaton Carew Road / Huntsman Drive Priority Junction;
- A1046 Port Clarence Road / A178 Seaton Carew Road Priority Junction;
- Haverton Hill Road / Clarence Street / Hope Street Signal Controlled Junction;
- A19 Portrack Interchange;
- A1185 / A178 Seal Sands Roundabout;
- A19 Wolviston Interchange;
- A19 Stockton Ring Road Interchange; and
- A19 Norton Interchange.

18.3.4. The Study Area will be refined as further information is made available and the Proposed Scheme's traffic and transport characteristics are fully developed, including cumulative impacts and AILs.

18.3.5. **Figure 18-2** shows the anticipated fixed routes for HGV movements during the construction phase.

18.3.6. As part of the PEIR a desk-study will also be undertaken to identify PRoW within the Study Area which may need to be closed or diverted (temporarily or permanently) to manage any potential conflict between non-motorised users and development generated traffic. At this stage it is anticipated that there will be no requirement to temporarily or permanently close or divert PRoW as part of the Proposed Scheme including the England's Coast Path which runs parallel to the A1046, Seaton Carew Road and crosses the Site access.



DO NOT SCALE

Information Classification:

PUBLIC

Information that is available to the general public and is intended for distrubution outside WSP.

Key

- Proposed DCO Application Boundary
- Study Area

Junction

- Junction 1 - A178 Seaton Carew Road / Huntsman Drive
- Junction 2 - A1046 Port Clarence Road / A178 Seaton Carew Road
- Junction 3 - Haverton Hill Road / Clarence Street / Hope Street
- Junction 4 - A1185 / A178 Seal Sands Roundabout
- Junction 5 - A19 Wolviston Interchange
- Junction 6 - Stockton Ring Road Interchange
- Junction 7 - Norton Interchange
- Junction 8 - A19 Portrack Interchange

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

APPLICANT: Lighthouse Green Fuels Ltd.

PROJECT: Lighthouse Green Fuels

TITLE: Figure 18.1 Study Area (Traffic and Transport)

SCALE @ A1:	CHECKED:		APPROVED:
1:15000	BP		PW
PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442		AV	13/07/2023

DRAWING No: 70102442-WSP-RP-ES-1801 REV: R-2

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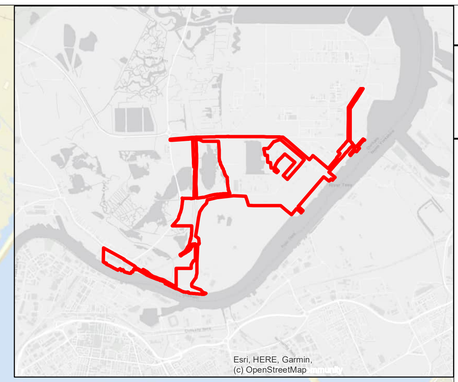

0 0.225 0.45 0.9 1.35 1.8 KM

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

DO NOT SCALE

Information Classification:
PUBLIC
Information that is available to the general public and is intended for distrubution outside WSP.

Key

Proposed DCO Application Boundary

HGV Routes

Northern Route

Southern Route

It should be noted that the large surface water body contained within the Proposed DCO Application Boundary has been filled in.

DRAWING STATUS: Final

Lighthouse Green Fuels

1 Cornhill, London, England, EC3V 3NR

APPLICANT: Lighthouse Green Fuels Ltd.

PROJECT: Lighthouse Green Fuels

TITLE: Figure 18.2 HGV Routing

SCALE @ A1:	CHECKED:		APPROVED:
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PROJECT No:	DESIGNED:	DRAWN:	DATE:
70102442		AV	13/07/2023

DRAWING No: 70102442-WSP-RP-ES-1802 REV: R-2

18.4. BASELINE CONDITIONS AND FUTURE BASELINE

Data Sources

18.4.1. The following sources of information will be used to define the Baseline conditions on which the Traffic and Transport assessment will be based:

- Desktop review to establish the baseline transport conditions, supplemented by a Site visit to corroborate the information and observe traffic conditions, quality of bus stop infrastructure, condition of footways etc.
- Non-Motorised Data – Public data such as Strava heat maps will be referenced and supplemented by observations on Site and local knowledge.
- Traffic counts (including JTC and ATCs);
  - Department for Transport (DfT) Road Traffic Statistics
  - Junction Turning Counts (JTCs) at junctions within the Study Area during 2023 during a neutral month for a 24-hour period on a weekday.
  - Automatic Traffic Counters (ATCs) on selected connecting highway links during 2023 during a neutral month for one week.
- Public transport scheduling information and timetables;
- Multiple map sources including Ordnance Survey (OS) maps, Public Rights of Way (PRoW) definitive maps, national and local cycle routes and Heavy Goods Vehicle (HGV) freight maps; and
- Personal Injury Collision (PIC) data for the period 1st January 2015 – 31st December 2019 inclusive to allow for a full highway safety analysis to be undertaken which is unaffected by the Covid-19 pandemic. PIC data will also be obtained for the period 1st January 2020 to the most recent period that data is available to ensure a comprehensive highways safety analysis has been undertaken. PIC data will be obtained from the LHAs to inform the highway safety analysis.

BASELINE

Local Highway Network

18.4.2. The Site is located in an area that is dominated by industrial uses. The north bank of the Tees is occupied by a variety of operations including petro-chemical facilities, storage and heavy engineering. Within the Order Limits, this includes:

- Majority of The North Tees Works Oil Refinery (and associated infrastructure including pipelines and storage tanks);
- Material Resource Facility (operated by N+P Group);
- Navigator North Tees Rail Terminal;
- Wilton Engineering Wharf; and
- Clarence Wharf.

18.4.3. The primary vehicular access to the Site is from A178, Seaton Carew Road. Huntsman Drive forms a priority junction with ghost island right turn with the A178, Seaton Carew Road.

18.4.4. Huntsman Drive connects the Site to the A178 Seaton Carew Road, which provides onward connections to the A1185 to the north-west and the A1046 to the south-west. The are two main routes towards the Strategic Road Network (SRN), the first is via the A1185 and A689, which links to the A19 Wolviston Interchange and the second is via the A1046, which connects to the A19 Portrack Interchange.

18.4.5. Internally, the Site is serviced by road via several points of vehicular access as follows:

- **Primary Project Site Access** - The primary access into the Project Site comprises a priority junction arrangement with Huntsman Drive. The primary access comprises two entry and two exit lanes. The associated barriers / security booth are set back 50m from Huntsman Drive; and
- **Staff/Visitor Car Park Access -** The car park access comprises one entry and one exit lane which serve the access and egress points of the existing staff / visitor car park.
- **Material Receipt Facility (MRF)** – The MRF site access comprises a priority junction formed with Huntsman Drive.
- **Maintenance/Emergency Access** - There is an emergency/maintenance access point located to the eastern part of the Site, which comprises a simple priority junction with Huntsman Drive. The access point is secured with a palisade gate that separates the Site from Huntsman Drive. There are crash barriers located on both sides of the bell-mouth along with pipelines that run on the eastern side of the access beneath Huntsman Drive.
- **Redundant Access** - A further access point is located to the western part of the Site, which comprises a simple priority junction with Huntsman Drive. It is understood that the access has been redundant for an extended period of time.

18.4.6. In addition, to the primary access from the public highway to the Site there is a further existing access to the Wilton Engineering Wharf. The Wilton Engineering Wharf is one of the Marine Transport Infrastructure options being considered as described in **Chapter 2: Site and Proposed Scheme Description**.

18.4.7. Beyond the Site, other land uses include Port Clarence landfill site, Teesside Gas Processing Plant and chemical works. Further details of the surrounding land uses are provided in **Chapter 2: Site and Proposed Scheme Description**.

Public Right of Way (PRoW) Network

18.4.8. The England Coast Path (ECP) runs parallel to the A1046, Seaton Carew Road in the vicinity of the Site and crosses the Site access. In the wider Study Area there are other Public Rights of Way (PRoW) that intersect road links including at least one

public footpath and one byway open to all traffic. **Figure 2-2** includes an overview of the PRoW network. At the PEIR stage a search of the definitive map will be completed.

Public Transport (Bus)

18.4.9. The closest bus stops to the Site are situated on the A178 Seaton Carew Road, to the north of the A178 Seaton Carew Road / Huntsman Drive junction. Both bus stops are located within lay-bys and served by Service 1.

18.4.10. Service 1 operates between Hartlepool and Middlesborough, via Seaton Carew, Port Clarence and Haverton Hill. During weekdays, there are up to two services per hour in either direction from between approximately 7am – 7pm. There is a similar level of service on Saturdays and an hourly service on Sundays.

18.4.11. The baseline conditions will be discussed with the relevant Highway Authorities, namely Stockton on Tees Borough Council (STBC), Hartlepool Borough Council (HBC), Middlesbrough Council (MC), and National Highways through additional scoping discussions.

FUTURE BASELINE

18.4.12. The following sources of information will be used to define the Future Baseline conditions on which the Traffic and Transport assessment will be based:

- **Committed Developments**: There may be the potential for cumulative impacts associated with the Proposed Scheme and committed developments in the surrounding area. Therefore, an assessment of the significance of the Cumulative Effects will be undertaken in the context of the potential interactions associated with the Proposed Scheme; and
- **TEMPro**: The Trip End Model Program (TEMPro) v7.2c software will be used to predict the level of background traffic growth within the local area between surveyed traffic flow year and the peak year of the construction phase.

18.4.13. Sensitivity testing may be undertaken where appropriate. This will be determined through scoping discussions with STBC and National Highways, this could include assessing different rates of build out associated with committed development.

18.5. SENSITIVE RECEPTORS

18.5.1. The following sensitive Receptors have been identified and will be considered within the EIA:

- **Motorised Users** – Motorised users of the surrounding highway network, including vehicle drivers and public transport users; and
- **Non-Motorised Users** – Non-motorised users of the surrounding highway network, PRoW and non-designated public routes, including pedestrians, equestrians (and vulnerable groups).

18.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION PHASE

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

- **Outline Construction Traffic Management Plan (oCTMP)** which will provide details of procedures for construction related traffic, including: number of vehicles; routes; frequency and timing of movements; worker hours and shift patterns; laydown areas and parking; and AILs; and
- **Outline Construction Worker Travel Plan (oCWTP)** which focuses on minimising the traffic impacts associated with construction workers travelling to and from Site.

18.6.2. These would sit either as an appendix to, or alongside the Code of Construction Practice (CoCP).

OPERATIONAL PHASE

18.6.3. It is considered that no design, mitigation, or enhancement measures will be required as the operational phase will likely not give rise to any significant environmental Traffic and Transport effects.

18.7. DESCRIPTION OF LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

18.7.1. It is anticipated that the construction phase is likely to be up to four year's duration. During this time, it is expected that a maximum of 750 workers will be required during the peak of the construction phase, with the average number of workers on Site reducing during the off-peak periods.

18.7.2. During the construction phase, some materials will be delivered by road (raw materials) and water (plant and prefabricated equipment) as set out in further detail in **Chapter 2: Site and Proposed Scheme Description**. The number of HGV movements associated with the construction phase will be developed as the Proposed Scheme progresses.

18.7.3. The likely significant effects for Traffic and Transport associated with the construction phase and therefore scoped into our assessment are set out in **Table 18-2**. These likely significant effects are the consequence of the impacts associated with changes in traffic flows resulting from the Proposed Scheme.

Table 18-2 – Traffic and Transport - Likely Significant Effects

Environmental Impacts	Description	Receptor
Driver Delay	Increases in traffic flows on existing roads can lead to traffic delays to non-development traffic which can occur at: ■ Key roads within the Study Area where there may be additional concentrations of traffic flow; and ■ Key junctions on the highway network near the Site.	Motorised users Non-motorised users
Road safety	The impact of the Proposed Scheme will be assessed in terms of its likely effect on the existing accident record and any potential increase in the number of accidents.	Motorised users Non-motorised users
Fear and intimidation	Fear and intimidation criteria are considered to be dependent on the volume of traffic, the proportion of HGVs, proximity to people and any deficiencies in protection offered which can be caused by issues such as narrow pavement widths.	Non-motorised users
Severance	Severance can occur when there is a perceived division within a community which becomes separated by a major traffic route. The assessment of severance considers specific local conditions and, in particular, the local pedestrian routes to key local facilities including crossings.	Non-motorised users
Pedestrian amenity	Some developments can bring about increases in the number of vehicle and pedestrian movements which can lead to greater increases in delay to pedestrians seeking to cross the road.	Non-motorised users

18.7.7. Further details on HGV movements associated with the construction phase will be submitted within the PEIR and ES.

OPERATIONAL PHASE

18.7.8. The likely significant effects with the Operational Phase will potentially relate to the same potential environmental impacts set out in **Table 18-2**. However, it is considered that the environmental impacts relating to potential movements of materials and workers during the operational phase can be scoped out for the following reasons.

Employees

18.7.9. Following completion of construction, it is anticipated that commercial operations will begin in Q1 2028. It is anticipated that up to 115 FTE employees will work at the SAF Plant with a further 120 FTE employees at other facilities forming part of the Proposed Scheme (such as the MRF adjacent to the SAF Plant Site) (see **Chapter 2: Site and Proposed Scheme Description**). Employees will work across varying shift patterns during the operational phase. It is considered that the anticipated employee

numbers will not significantly increase traffic generation when compared to the Site's extant planning permission.

18.7.10. An additional 600 indirect FTE jobs across the UK and 40 FTEs at an off-Site MRF would also potentially be created and there would be significant supply chain opportunities for national, regional and local businesses. These jobs are outside the Study Area and likely be spread across a mix of existing and expanding businesses elsewhere in the country.

Materials

18.7.11. The neighbouring MRF facility will transfer SRF feedstock to the proposed facility via conveying equipment. Additional SRF and/or waste biomass feedstock will be sourced from other MRFs nationally and it is the applicant's intention that all of this additional feedstock will be delivered by rail (it is anticipated that approximately 25% of the feedstock will come from the neighbouring MRF with around 75% coming from other MRFs (estimated up to 3 other extra MRFs)). However, in some circumstances, some of these extra MRFs may not have direct access to rail and so as a contingency, up to 400,000 tonnes per annum (TPA) of feedstock may be transported by road to allow for any instances where use of rail is not possible due to factors beyond the applicant's control.

18.7.12. The Site also remains subject to extant planning consents (Planning Reference 13/2185/VARY and 13/0780/EIS, and 18/1967/VARY) for the TV1 and TV2 energy from waste facilities. These facilities combined are permitted to process 770k TPA (2 x 385k TPA) of waste, with an additional requirement to import 13k TPA metallurgical coke and 31k TPA of limestone flux reagent for each of the two EfW sites (another 2 x 44k TPA in total). Furthermore, the quantity of waste material (vitrified slag) leaving both sites via HGVs would be 114k TPA.

18.7.13. It is anticipated that the changes to traffic flows as a result of the Proposed Scheme during operation are not expected to change by more than 10% when compared to the site's permitted use and therefore, in line with IEMA Guidelines (**Ref 18.16**), operational traffic movements from the Proposed Scheme can be scoped out. Further evidence on the proposed traffic movements will be provided in the Transport Assessment to be prepared as part of the DCO application.

DECOMMISSIONING PHASE

18.7.14. The likely significant effects associated with the Decommissioning Phase will potentially relate to the same environmental impacts set out in **Table 18-2**. The traffic impacts of Site decommissioning works are uncertain at this stage. However, it is anticipated that they would be similar to or less than the Construction Phase and therefore are scoped out. A Demolition Environmental Management Plan (DEMP) would be prepared at the time of decommissioning.

ELEMENTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

18.7.15. The impacts scoped in or out for Traffic and Transport are outlined in **Table 18-3**.

Table 18-3 – Elements Scoped In or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Development generated construction traffic	Construction	✔		The construction traffic impacts of Site construction works, including the requirements of AIL, will be assessed as part of the ES. At this stage, construction traffic volume and movements are not known. Further information to establish the construction traffic generation and profile will be sought from the Applicant.
AILs delivery strategy	Construction	✔		At this stage, the size and number of AIL movements are not known, nor is the type of vehicle required to be used. The ES will confirm the worst-case number of abnormal loads required and the types of vehicles required. Any mitigation measures required to facilitate the delivery of abnormal loads will be detailed in the ES and any resultant likely significant effects assessed.
Proposed Scheme's generated operation traffic	Operational		✔	The operational traffic impacts of Site operation works are not expected to change by more than 10% when compared to the sites existing use and therefore, in line with IEMA Guidelines (**Ref 18.16**) can be scoped out. This will be evidenced in the Transport Assessment as part of the application.
Development generated decommissioning traffic	Decommissioning		✔	The traffic impacts of Site decommissioning works are uncertain at this stage, and it is considered that the likely significant effects would be no worse than the Construction Phase. A DEMP would

Element	Phase	Scoped In	Scoped Out	Justification
				be prepared at the time of decommissioning

18.8. PROPOSED ASSESSMENT METHODOLOGY

OVERVIEW

18.8.1. The proposed assessment methodology will be used to evaluate the Traffic and Transport environmental effects associated with the Proposed Scheme construction phase only. Operational and decommissioning impacts will not be considered in the ES. The assessment methodology and the assumptions underpinning the assessment will be agreed with STBC (LHA) and National Highways to ensure that it meets the necessary standards and guidelines. HBC and MC will also be consulted as neighbouring highway authorities.

18.8.2. It is anticipated that the following documents will be produced as part of the EIA:

- Environmental Statement (ES) – Traffic and Transport Chapter;
- Transport Assessment (TA);
- Outline Construction Traffic Management Plan (oCTMP); and
- Outline Construction Worker Travel Plan (oCWTP).

18.8.3. Statements of Common Ground (SoCG) will be prepared in relation to the Traffic and Transport impacts with the relevant authorities and organisations.

18.8.4. The proposed assessment methodology will draw upon the policy, legislation and guidance contained within **Section 18.2**, along with the key Traffic and Transport details outlined in the following subsections.

COMMITTED DEVELOPMENTS

18.8.5. There may be the potential for cumulative impacts associated with the Proposed Scheme and committed developments. Therefore, it is anticipated that an assessment of the significance of the Cumulative Effects will be undertaken in the context of the potential interactions associated with the Proposed Scheme.

18.8.6. To ensure all committed developments are accounted for, it is requested that STBC and National Highways provide a list of ‘reasonably foreseeable’ committed developments for further review as part of the cumulative impacts of the Proposed Scheme. The methodology for establishing a Long List and Short List is set out in **Chapter 21: Cumulative Effects**.

ASSESSMENT SCENARIOS

18.8.7. The following assessment scenarios are proposed and will be discussed further with STBC through additional scoping discussions:

- **Existing Scenario** – this will be the 2023 surveyed traffic flows;
- **Baseline Scenario** – this is the surveyed traffic flows and traffic growth applied using TEMPro;
- **Do Minimum Scenario** – this is the Baseline Scenario plus 'reasonably foreseeable' committed development; and
- **Do Something Scenario** – this is the Do Minimum plus construction traffic associated with the Proposed Scheme.

18.8.8. If traffic surveys are required, the survey methodology will be discussed with STBC as the LHA. It is not anticipated that surveys of National Highways, HBC, or MC junctions/links will be required, but as the neighbouring LHA's to the north and south, respectively, they will be consulted where appropriate.

SIGNIFICANCE OF EFFECT CRITERIA

18.8.9. The traffic generated by the Proposed Scheme will be used to assess the impacts on the key links and junctions on the surrounding network. The likely effects of the Proposed Scheme in environmental terms will be evaluated in accordance with IEMA Guidelines (**Ref. 18.16**). The transport related environmental effects include the following environmental impacts:

- Driver Delay - The use of industry standard junction capacity modelling programs provides a methodology to quantify junction delay. Driver delay is only likely to be significant where the existing Study Area highway network is at or close to capacity;
- Highway Safety - Highway safety is assessed by the frequency and severity of injury accidents that are attended by the police and recorded in official accident statistics. Intensification of use or changes in the composition of traffic has the potential to have an effect on collision rates. The examination of recent collision statistics on routes within the Study Area will highlight any hotspots that need further examination. PIC records for the local highway network will be examined for the five-year period prior to the onset of the Covid-19 pandemic to allow for a full highway safety analysis to be undertaken which is unaffected by the Covid-19 pandemic, along with obtaining all PIC records since then to ensure a comprehensive analysis has been undertaken.
- Fear and intimidation - The volume of traffic and its HGV composition are the factors that contribute to fear and intimidation. In the absence of thresholds set out in the IEMA Guidelines (**Ref 18.16**), this EIA Scoping Report proposes that changes in total traffic flow of 30%, 60% and 90% are considered to result in slight, moderate or substantial impacts;
- Severance - Severance occurs in a community when a major artery separates people from places and other people. Severance occurs from difficulty of crossing a road or where the road itself creates a physical barrier. Severance can be caused to pedestrians or motorists. The IEMA Guidelines (**Ref 18.16**) suggest that

changes in total traffic flow of 30%, 60% and 90% result in slight, moderate and substantial changes in severance respectively; and

- Pedestrian amenity - Pedestrian amenity is broadly defined as the relative pleasantness of a journey, and is considered to be affected by traffic flow, traffic composition, pavement width and separation between vehicles and pedestrians. The impact manifests itself in fear and intimidation, exposure to noise and vehicle emissions. The IEMA Guidelines (**Ref 18.16**) suggest that a doubling or halving of total traffic flow or the HGV composition could lead to perceptible negative or positive impacts upon pedestrian amenity.

18.8.10. The construction traffic generated by the Proposed Scheme will be used to assess the impacts on the key links and junctions on the surrounding network. The significance of the Traffic and Transport related environmental effects will be based on the magnitude of change associated with the Proposed Scheme, the sensitivity of the affected receptor, and will be reported using the classifications and matrix for significance basis set out in **Chapter 3: Approach to EIA**.

18.8.11. For many receptors, there are no simple rules or formulae which define thresholds of significance and there is, therefore, a need for interpretation and the application of professional judgement on the part of the assessor, backed-up by data or quantified information wherever possible.

18.8.12. A desktop exercise will be undertaken to classify the sensitivity of the routes within the Study Area based on the guidance in LA104 (**Ref 18.20**). The classification of the link sensitivity is based on professional judgement. For example, if the route passes a school, care home or similar it would have a higher sensitivity due to the presence of vulnerable users. Similarly, if the route runs through the middle of a town or village, it would have a higher sensitivity than if there was limited direct access to frontage development.

18.8.13. In accordance with Table 3.2N in DMRB 'LA 104 - Environmental assessment and monitoring' (**Ref 18.20**), the sensitivity of the affected receptors will be assessed on a scale of high, medium, low and negligible in the context of the sensitivity of the road links within the Study Area.

18.8.14. The sensitivity of a road link, or the immediate area through which it passes including PRoW, is defined by the type of user groups who may use it. Vulnerable users include elderly residents and children. It is also necessary to consider footpath and cycle route networks that cross the roads within the Study Area. The sensitivity will be informed by information obtained from viewing Strava 'heat maps' of the local area showing the usage of routes including PRoW and other non-PRoW routes, in addition to local knowledge and site visits.

18.8.15. The sensitivity of a junction will be classified in relation to the baseline operational performance of the junction. The level of traffic a junction can theoretically accommodate without incurring significant delays and / or congestion, the 'capacity',

is compared to the level of traffic which is typically travelling through that junction. This relationship between capacity and traffic flow is assessed by the metric of 'Ratio of Flow to Capacity' (RFC). It is typically recognised that a maximum RFC value of 0.85 is desirable. If the RFC is greater than this, but below 1.00, this suggests that the traffic flow is approaching capacity and at risk of queues building. Where an RFC exceeds 1.00, the junction is exceeding theoretical capacity.

18.8.16. The sensitivity of a junction will be assigned according to the following rationale:

- Any junctions with an RFC less than 0.5 have been categorised as having a Negligible sensitivity;
- Any junctions with an RFC between 0.5 and 0.7 have been categorised as having a Low sensitivity;
- Any junctions with an RFC between 0.7 and 0.85 have been categorised as having a Medium sensitivity;
- An RFC of between 0.85 and 1 have been categorised as having a High sensitivity;
- Any junctions with an RFC of over 1 have been classified as having a Very High sensitivity.

18.8.17. Consultation with stakeholders can determine the sensitivity of each Receptor. The specific impact Magnitude and significance criteria of each Receptor will be agreed with the LHAs and National Highways, taking into account locally specific issues.

18.9. LIMITATIONS AND ASSUMPTIONS

18.9.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- The 'Construction Phasing' and associated construction worker profile will be developed with the Applicant and the relevant contractors. This will feed into discussions regarding assessment scenarios and will be shared with the highway authorities; and
- The assessment assumes that additional staff, deliveries or trips to the Proposed Scheme will be negligible during the Operational Phase of the Proposed Scheme and thus deemed insignificant in terms of Traffic and Transport.
- The scope of the Traffic and Transport assessment has not yet been discussed with STBC or National Highways. This will be carried out during the preparation of the PEIR and prior to the ES being completed.
- Rail Movements – The Proposed Scheme may result in an increase in rail movements associated with transferring waste feedstock (SRF) from other MRFs across the UK and transferred by rail to the Navigator North Tees Rail Terminal. The SRF pellets would then be transferred to the intermediate storage via conveying equipment to be installed between the rail terminal and the main SAF Plant. This will be considered further as part of the PEIR.

18.10. REFERENCES

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Ref 18.16: Institute of Environmental Assessment. (1993). Guidelines for the Environmental 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

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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, operation and decommissioning, caused by natural hazards 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. For the purpose of the EIA, the vulnerability of the Proposed Scheme to a MA&D event during decommissioning is anticipated to be no worse than that for the construction phase following the implementation of risk management plans for decommissioning. Construction and decommissioning are therefore considered together.

19.1.2. 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.

19.1.3. 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.

19.1.4. 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

Category	Type
	Pollution Accidents
	Utility Failures
	Malicious Attacks
	Engineering Accidents and Failures

19.1.7. This chapter should be read in conjunction with technical topic chapters **(Chapter 5: Air Quality** to **Chapter 20: 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.

19.1.8. 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 in **Section 19.2**) 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.

Term	Definition
Consultation Zone	The Office for Nuclear Regulation (ONR) and the HSE set consultation distances around nuclear installations, major hazard sites and major accident hazard pipelines after assessing the risks and likely effects of major accidents at the nuclear installation/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 duty to consult the ONR/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 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 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. ■ 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 follows:

Table 19-3 - MA&D – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
National Planning Policy Framework (NPPF) 2021(**Ref. 19.2**)	The NPPF 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 Framework states that "*local planning authorities should consult the appropriate bodies when considering applications for the siting of, or changes to, major hazard sites, installations or pipelines, or for development around them*." It goes on to state that "*Planning policies and decisions should promote public safety and*

Policy / Legislation / Guidance	Description
	take into account wider security and defence requirements by anticipating and addressing possible malicious threats and natural hazards." It also states that *"Planning policies and decisions should ensure that: a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining*."
'Overarching National Policy Statement for Energy 2011' (EN-1) (**Ref. 19.3**) and 'National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines 2011' (EN-4) (**Ref. 19.4**)	Together they provide the primary basis for decision by the Infrastructure Planning Commission (IPC) on applications it receives for gas supply infrastructure and gas/oil pipelines.
Other Policy	
'Draft Overarching National Policy Statement for Energy 2023 (EN-1)' (**Ref 19.5**) and 'Draft National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines 2023 (EN-4)' (**Ref 19.6**)	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 19.3**) and NPS EN-4 2011 (**Ref 19.4**) with regards to major accidents and disasters.
Stockton-on-Tees Borough Council - Local Plan (Adopted 30 January 2019) (**Ref. 19.7**)	The Local Plan sets out the Council's policies and proposals to guide planning decisions and establishes the framework for the sustainable economic growth and development of the Borough up to 2032. Policy EG4 specifically considers development proposals for hazardous installations, uses related to the process industries, or emerging specialist sectors. It states that: *"Proposals which require hazardous substance consent will be designed and located to prevent an unacceptable increase in the level of risk to human health and the environment from an industrial accident or prejudice adjacent operational facilities or allocated sites."*
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

Policy / Legislation / Guidance	Description
	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 19.8**)	The Act provides the framework for the regulation of workplace health and safety in the UK. It provides a legal framework for the provision of safe plant and equipment and prevention of harm to people from occupational hazards present in a workplace, including emergencies, which may affect those offsite or visiting the Proposed Scheme.
Construction (Design and Management) (CDM) Regulations 2015 (**Ref 19.9**)	These Regulations place legal duties on almost all parties involved in construction work, with specific duties on clients, designers and contractors, so that health and safety is considered throughout the life of a construction project from inception to demolition and removal. The client, designer(s) and contractor(s) must avoid foreseeable risks, so far as is reasonably practicable, by eliminating hazards associated with the design, construction, operation and maintenance of the Proposed Scheme. The Regulations ensure that mechanisms are in place to continually identify, evaluate and manage safety risks throughout the design, construction and operation phases of the Proposed Scheme. Many of the risks identified and managed at the detailed design phase also serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction and operation phases.
Control of Major Accident Hazards (COMAH) Regulations 2015 (**Ref 19.10**)	The purpose of the COMAH Regulations is to prevent major accidents involving dangerous substances and limit the

Policy / Legislation / Guidance	Description
	consequences to people and the environment of any accidents which do occur. There are at least 22 COMAH sites within a 5km radius of the Proposed Scheme.
The Planning (Hazardous Substances) Regulations 2015 (**Ref 19.11**)	These Regulations transpose the land-use planning requirements of the European Seveso III Directive and relate to the way hazardous substances consents operate, and the way in which the planning system reduces the likelihood and impact of major accidents. Hazardous substance consents focus on ensuring the safety of the public around the consented site from potential major accident hazards. Many of the risks identified and managed at the detailed design phase also serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction, operation and decommissioning phases.
The Supply of Machinery (Safety) Regulations 2008 (**Ref 19.12**)	The Regulations aim to remove technical barriers to trade, in particular products, by harmonising national health and safety provisions applicable to such products when they are first placed on the market or put into service in the European Economic Area. Many of the risks identified and managed in the design of machinery used in and associated with the Proposed Scheme will serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction and operation phases of the Proposed Scheme.
The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) (**Ref 19.13**)	DSEAR implements the Chemical Agents Directive 98/24/EC and the Explosive Atmospheres Directive 99/92/EC. DSEAR sets minimum requirements for the protection of staff from fire and explosion risks arising from dangerous substances and potentially explosive atmospheres. Under the regulations, the Proposed Scheme will require that mechanisms are in place to identify, evaluate and manage the risk of a major accident due to loss of containment to 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.

Policy / Legislation / Guidance	Description
The Equipment and Protective Systems for Use in Potentially Explosive Atmospheres Regulations 1996 and 2016 (**Ref 19.14**)	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 Sustainable Aviation Fuel (SAF) or naphtha from the Proposed Scheme and therefore reduce the risk of a major accident.
Occupier's Liability Act 1984 (c.3) (**Ref 19.15**)	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 19.16**)	The purpose of these Regulations is to ensure that pipelines are designed, constructed and operated properly to ensure their integrity and reduce risks.
Guidance	
IEMA: Major Accidents and Disasters in EIA: A Primer 2020 (**Ref 19.17**)	The purpose of the primer is to increase awareness of the MA&D topic and its application within all stages of EIA. The primer outlines an assessment methodology based on known current practice within the UK and provides definitions of key terminology. The Primer is structured around a typical assessment approach and provides a proportionate method for considering major accidents and disasters through the stages of EIA.
'Green Leaves III' Guidelines for Environmental Risk Assessment and Management 2011 (**Ref 19.18**)	Providing generic guidance for the assessment and management of environmental risks. A cyclical framework for risk management is presented that identifies four main components of risk assessment: ■ formulating the problem; ■ carrying out an assessment of the risk;

Policy / Legislation / Guidance	Description
	■ 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 19.19**)	Providing generic guidance on how to undertake environmental risk assessments required by the COMAH Regulations. It provides: ■ A definition of the types of harm that should be considered in an environmental risk assessment, and how the harm should be characterised for the assessment. In this context, the level of environmental harm that would be considered serious has been defined for various different receptor types in terms of the combination of the: ~ extent (the area / distance); ~ severity (the degree of harm within the area of impact); and ~ duration (the recovery period). For environmental harm to be considered serious then all parameters must exceed the receptor thresholds as defined in this guideline. The thresholds reflect expert opinion on levels of harm that would be considered serious, with consideration to various receptor specific areas of legislation (such as the Water Framework, 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

Policy / Legislation / Guidance	Description
	▪ guidance on how the risks may be evaluated.
ISO 31000:2018 Risk Management – Guidelines 2018 (**Ref 19.20**)	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. STUDY AREA

19.3.1. Based on professional judgement, the following factors, and associated distances from the Site, 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 zone1);
  - Control of Major Accident Hazard facilities within 5km;
  - Major accident hazard pipelines within 1km;
  - Nuclear installations within 3km (distance to The Land Use Planning Outer Consultation Zone2);

[1] Defined by the Civil Aviation Authority.
[2] Defined by the Office for Nuclear Regulation.

  - 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.
- 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).

19.3.2. 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 below.

19.4. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

19.4.1. 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.

19.4.2. The baseline conditions described for MA&D are derived from the following desk study sources:

- National Risk Register of Civil Emergencies (**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 5: Air Quality** to **Chapter 20: Marine Navigation**).

FUTURE BASELINE

19.4.3. In the future baseline and in the absence of the Proposed Scheme, it is considered that the current industrial land use within the study area would remain the same.

19.5. SENSITIVE RECEPTORS

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 ENCHANCEMENT 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, operation and decommissioning phases);
- Environmental, Health & Safety Management systems (during the construction, operation and decommissioning phases);
- supplier management environmental, health and safety standards (e.g. Construction Skills Certification Scheme) (during the construction, operation and decommissioning phases);
- risk management systems (during the construction, operation and decommissioning phases); and
- a Code of Construction Practice (CoCP) (during the construction phase).

19.6.2. This assessment assumes that embedded mitigation measures identified in each of the technical topic chapters (**Chapter 5: Air Quality** to **Chapter 20: Marine Navigation**) will be implemented for the Proposed Scheme, in order to assess the 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 19.4**), 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 19.21**). 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 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

Likelihood and Consequence Events

19.7.3. 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 (see **Table 19-2**).

19.7.4. Highly likelihood and low consequence events are also scoped out, as they will not lead to significant adverse effects.

19.7.5. 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.

19.7.6. The remaining events, low likelihood and high consequence events, are the subject of the MA&D assessment. Using professional judgement, the assessment identifies relevant events and determines whether a significant environmental effect is possible.

Occupational Health and Safety

19.7.7. In accordance with emerging EIA practice, occupational health and safety (H&S) is scoped out of this topic. Other health issues are covered in relevant topic sections of **Chapter 5: Air Quality**, **Chapter 6: Noise and Vibration** and **Chapter 9: Water Environment and Flood Risk**. As 'in combination' impacts, human health is also considered within **Chapter 21: Cumulative Effects**, not least as it is covered by detailed H&S legislation: The Management of Health and Safety at Work Regulations 1999 (**Ref 19.29**), The Workplace (Health, Safety and Welfare) Regulations 1992 (**Ref 19.30**) and The Dangerous Substances and Explosive Atmospheres Regulations 2002 (**Ref 19.13**).

IMPACTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

19.7.8. A long list of all possible MA&D groups, categories and types has been prepared below, **Table 19-4**. 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.

19.7.9. Those MA&D types that cannot be screened out from the three component process will require further detailed assessment in the ES.

19.7.10. 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 a MA&D at the type level. A determination on if the MA&D type is to be scoped in or out of the MA&D assessment is provided, in accordance with either phase of the Proposed Scheme. The phases are indicated in the table as "C" for construction, "O" for operation and “D” for decommissioning. 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.

Table 19-4 - Elements 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? 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. In addition, uplift from the melting of the ice sheets that covered many parts of Britain thousands of years ago can also 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 (**Ref 19.21**) 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"*. 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.	No
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 Scheme. Therefore, further consideration of this risk is not required as part of the ES.	No
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	No

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			Proposed Scheme. Therefore, further consideration of this risk is not required as part of the ES.	
Natural Hazards	Geophysical	Sinkholes	There are no examples of sinkholes in the locality. 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.	No
Natural Hazards	Geophysical	Tsunamis	The Proposed Scheme is located in Teesside, inland, outside a tsunamis risk zone within (Proposed Jetty / Wharf) and adjacent to the River Tees. 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 meteotsunamis affecting the River Tees. Therefore, this risk event type has been scoped out.	No
Natural Hazards	Hydrological	Coastal Flooding	A review of the Environment Agency's Flood Map for Planning (**Ref 19.32**) shows that majority of the Site is located in the low-risk Flood Zone 1 (land with less than a 1 in 1000 annual probability of flooding from fluvial or tidal sources). However, the west, north-west and east of the Site is shown to be located partially within Flood Zones 2 (land having between a 1 in 200 and 1 in 1000 annual probability of tidal flooding) and 3 (land having a 1 in 200 or greater annual probability of tidal flooding).	Yes C, O, D

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			Construction of the Proposed Scheme may temporarily or permanently reduce the capacity of the existing floodplain storage and/or impact the existing flood flows. Therefore, it is proposed to scope in this MA&D type for further consideration in the ES.	
Natural Hazards	Hydrological	Fluvial Flooding	A review of the Environment Agency's Flood Map for Planning (**Ref 19.32**) shows that majority of the Site is located in the low-risk Flood Zone 1 (land with less than a 1 in 1000 annual probability of flooding from fluvial or tidal sources). However, the west, north-west and easterly regions of the Site are shown to be located partially within Flood Zones 2 (land having between a 1 in 100 and 1 in 1000 annual probability of fluvial flooding) and 3 (land having a 1 in 100 or greater annual probability of fluvial flooding). Construction of the Proposed Scheme may temporarily or permanently reduce the capacity of the existing floodplain storage and/or impact the existing flood flows. Therefore, it is proposed to scope in this MA&D type for further consideration in the ES.	Yes C, O, D
Natural Hazards	Hydrological	Pluvial Flooding	A review of the Environment Agency's Flood Risk from Surface Water mapping (**Ref 19.33**) shows small, isolated areas within the Site which are indicated to be at low to high susceptibility to flooding from surface water. These areas are likely to be associated with the locally low ground where water would pond after intense or prolonged rainfall events. There is the potential to increase the amount of impermeable area as a result of the Proposed Scheme. This would potentially result in an increase in the rate and volume of surface water runoff generated in the area and may increase the risk of flooding in the	Yes C, O, D

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			area or elsewhere. Therefore, it is proposed to scope in this MA&D type for further consideration in the ES.	
Natural Hazards	Hydrological	Groundwater Flooding	The majority of the Site is classified as having a low risk to groundwater flooding attributed to the low permeability Mercia Mudstone Group. The western boundary of the Site (towards Seaton Carew Road) is classified as having high risk to groundwater flooding attributed to the permeable Sherwood Sandstone Group. There is the potential for increased groundwater flooding susceptibility e.g. from intrusive works and/or construction of groundwater flow barriers (piling works) at specific locations for the Proposed Scheme. Therefore, it is proposed to scope in this MA&D type for further consideration in the ES.	Yes C, O, D
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.	No
Natural Hazards	Climatological and Meteorological	Cyclones, hurricanes, typhoons, storms and gales	Cyclones, hurricanes and typhoons do not occur in the UK. The local area is one of the more sheltered parts of the UK. The most recent notable gale affecting the region was in February 2023 where Storm Otto led to wind speeds reaching over 65mph in the area of the Proposed Scheme, resulting in disruption to	No

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			transportation and damage to some buildings[3]. 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 event for the Proposed Scheme would be comparable to that for other industrial sites in the vicinity and design 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 in the vicinity. New elevated structures will be designed taking into account historical experience at this location and current design standards which consider climate change resilience. Specific measures are therefore not considered to be required as part of the Proposed Scheme.	No
Natural Hazards	Climatological and Meteorological	Wave surges	The Proposed Scheme is located sufficiently inland, and therefore is not subject to wave surges	No

[3] https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2023/2023_01_storm_otto.pdf

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
Natural Hazards	Climatological and Meteorological	Extreme temperatures: Heatwaves Low (sub-zero) temperatures and heavy snow	High temperature records are being broken with increasing frequency. On 3rd August 1990, a record high of 37.1°C was reached in Cheltenham[4]. This was broken in 2003, when 38.5°C was reached in Faversham, Kent[5], then again in 2019, when Cambridge reached 38.7°C[6], 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[7]. 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: ■ Between 1981 and 2010, there were 154 occurrences in which summer mean temperatures exceeded 18.09°C on five or more consecutive days;	No

[4] https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/1990/hot-spell-august-1990---met-office.pdf
[5] https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2003/hot-spell---august-2003---met-office.pdf
[6] https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2019/2019_007_july_heatwave.pdf
[7] https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2022/2022_03_july_heatwave.pdf

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			■ Between 1981 and 2010, there have been 1226 days with a maximum minimum temperature below zero degrees Celsius; and ■ Between 1981 and 2010, there were 217 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, the Proposed Scheme 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. Potable water for the area of the Proposed Scheme is supplied from the Kielder Water Resource Zone. A number of aquifers are present in the study area and there is one active groundwater abstraction within the Site and two within 250m of the Site. The nearest active potable abstraction borehole is recorded 647m southwest for drinking water abstracted from the sandstone. 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. 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	No

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			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 the process, 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 should 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 (**Ref 19.21**). There will be the use of technology to control processes and plant, however this will be appropriately protected, therefore the Proposed Scheme is no more vulnerable than other similar infrastructure in the locality.	No
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.	No
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 there was no known significant impact on road users or infrastructure (**Ref 19.21**).	No

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
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 workers travelling to the site, but this risk would not be significantly different from the baseline. Workers' health and safety is also managed by Occupational Health and Safety legislation.	No
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. England received only 21% of its usual rainfall for April 2011[8]. The Proposed Scheme is located in a heavily industrial area. There is some vegetation in the surrounding area, but it does not have a potential high fuel load (e.g. gorse) and as such it is unlikely that a wildfire would occur. Urban fires are assessed under manmade hazards below.	No
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	

[8] https://www.metoffice.gov.uk/public/weather/fire-severity-index/documents/Spring_2011_fire_weather_conditions_tcm6-35277.pdf

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			conditions. Summer 2015 also contained two elevated ozone episodes (**Ref. 32**). **Construction:** Construction effects would be temporary for the duration of the construction phase. The construction of the facility is likely to result in the following impacts: ■ Nuisance dust deposition at nearby designated nature conservation sites and residential receptors; ■ Changes in local concentrations of NO_X, NO_2 and particulate matter as a result of the operation of: – construction vehicles on the public highway – employee travel to and from the Proposed Scheme location – Changes in local concentrations of NO_X, NO_2, SO_x and particulate matter as a result of the flows of marine construction traffic on the River Tees. **Operation:** Operational impacts are likely to be in the form of changes in the local concentrations of air pollutants. These might include: ■ Changes in concentrations of NO_X, NO_2, SO_x particulate matter, trace elements and heavy metals; ■ Potential emissions of volatile organic compounds (VOC), hydrochlorofluorocarbons (HCFC), chlorofluorocarbons (CFC), hydrofluorocarbons (HFC), chlorinated solvents or NH_3; ■ Odour emissions ■ Emissions of amines and their derivatives; and	

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			▪ Emissions of naphthalene. Each of these changes may affect both human and ecological receptors. The introduction of these new emission sources and pollutants will require an application for 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 event are not anticipated during construction and operation of the Proposed Scheme.	
Natural Hazards	Biological	Disease epidemics: ▪ Viral; ▪ Bacterial; ▪ Parasitic; ▪ Fungal; and ▪ Prion.	The Proposed Scheme is located in a developed country where the population is in general good health. The most recent disease epidemics in England was COVID-19, the first cases of which were identified in February 2020. Although no longer considered a global health emergency by The World Health Organisation, the vulnerability of the Proposed Scheme to a major event caused by COVID-19 during 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 construction and use of the Proposed Scheme will not give rise to any disease epidemics. The UK Health Security Agency, the executive agency of the Department of Health is responsible for protecting the nation from public health hazards, preparing for and responding to public health emergencies. One of the UK Health Security Agency's	No

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			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'. Risks from Weil's Disease (or leptosporosis) is 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 workers to contract Weil's as appropriate PPE will be worn and any risks managed in the construction environmental management plan.	
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 during the period between 2021-2023[9], although with no human cases reported. There was a devastating foot and mouth outbreak in 2001 (**Ref 19.21**). There are no known foot and mouth burial pits in the area, and it is considered unlikely that they will be present in the Proposed Scheme area due to its highly industrialised 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.	No

[9] https://www.nfuonline.com/updates-and-information/avian-influenza-cases-confirmed-latest-news/

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
Natural Hazards	Biological	Plants	Invasive plant species (including Japanese Knotweed, Giant Hogweed, Wall Cotoneaster, Himalayan Cotoneaster and Montbretia) have been recorded within the Site. 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.	No
Technological or Manmade Hazards	Societal	Extensive public demonstrations which could lead to violence and loss of life.	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 Scheme should not lead to high profile public demonstrations or disorder.	No
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.	No
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.	No
Technological or Manmade Hazards	Societal	The hindrance or prevention of humanitarian assistance by political	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.	No

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
		and military constraints.		
Technological or Manmade Hazards	Societal	Significant security risks for humanitarian relief workers in some areas.	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.	No
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.	No
Technological or Manmade Hazards	Societal	Displaced population	There will be no displacement of populations as part of the Proposed Scheme.	No
Technological or Manmade Hazards	Industrial and Urban Accidents	Major Accident Hazard Chemical sites	There are 22 Control of Major Accident Hazard (COMAH) sites within a 5km radius of the Proposed Scheme. These sites include: ■ Exwold Technology Limited (lower tier); ■ SNF Oil and Gas Limited (upper tier); ■ Univar Solutions UK Limited (upper tier); ■ Wood Group PSN Limited (upper tier); ■ Venator Materials UK Limited (upper tier); ■ EDF Energy Nuclear Generation Limited (lower tier); ■ BOC Limited (upper tier); ■ Air Products (BR) Limited (lower tier); ■ Chemoxy International Limited (upper tier);	Yes C, O, D

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			■ MP Storage and Blending Limited (lower tier); ■ CF Fertilisers UK Limited (upper tier); ■ SABIC UK Petrochemicals Limited (upper tier); ■ Navigator Terminals North Tees Limited (upper tier); ■ Exolum Seal Sands Limited (upper tier); ■ Calor Gas Limited (upper tier); ■ Industrial Chemicals Limited (upper tier); ■ Exolum Riverside Limited (upper tier); ■ Fine Organics Limited (upper tier); ■ ConocoPhillips (U.K.) Teesside Operator Limited (upper tier); ■ Navigator Terminals Seal Sands Limited (upper tier); ■ Tees Valley Net Zero Limited (lower tier); and ■ px (TGPP) Limited (upper tier).	
Technological or Manmade Hazards	Industrial and Urban Accidents	Major Accident Hazard Pipelines	Due to the industrial nature of the area there are numerous major accident hazard pipelines within a 1km radius of the Proposed Scheme. These include, but are not limited to, pipelines operated by: ■ BOC Ltd; ■ Gowhow (UK) Ltd; ■ Millennium EfW; ■ Air Products (UK) Ltd; ■ Sabic; ■ Northern Gas Networks; and ■ National Grid Gas PLC.	Yes C, O, D
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 (**Ref 19.21**).	No

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			The nearest nuclear facility is Hartlepool Power Station which is approximately 2.5km from the closest point of the proposed northern pipeline corridor and approximately 3.6km from the closest point of the bulk liquid storage area. The development of the Proposed Scheme in the existing heavily industrialised area of Teesside is not going to significantly increase the risk of a MA&D impacting Hartlepool Power Station. Therefore, further consideration of this risk is not required as part of the ES.	
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 numerous fuel storage sites within the study area as identified above (under major accident hazard chemical sites), including Exolum and Conoco Phillips approximately 380m from the closest point of the proposed northern pipeline corridor and Navigator Terminals Seal Sands adjacent to the proposed northern pipeline corridor. Navigator Terminals North Tees Limited is located within the Site.	Yes C, O, D
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 (**Ref 19.21**). The Environment Agency Flood Risk summary indicates that flooding from reservoirs is unlikely in this area.	No

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
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. The risk from coal mining related features is therefore considered to be negligible. The following mining related features have been identified on, or within 250m of the Proposed Scheme: ■ One Brine Well recorded 133m southwest, ceased operation; ■ Surface ground working (multiple refuse heaps, unspecified pits, ponds and water bodies) on, and within 250m of, the Proposed Scheme; ■ Underground workings, two tunnels recorded within the Site; ■ A historical mineral planning area for surface mineral working of salt within the Site; ■ Non-coal mining related underground workings for brine. Multiple records on, and within 250m of, the Site; and ■ Mining cavities comprising reported abandoned mineral workings and possible surface instability problems. One recorded within the Site and seven within 250m of the Site. The risks are limited to construction workers who are outside of the scope of the MA&D assessment. In addition, the geotechnical design will consider risks associated with ground stability at the detailed design stage. Therefore, further consideration in relation to MA&D in the ES is not required.	No
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	No

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			the appointed contractor to manage the risk of fire. Therefore, further consideration in the ES is not considered necessary. Teesside International Airport is located approximately 14km south west 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 heavily industrial area. 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 the Proposed Scheme would generate or attract any hazardous loads. Operation: The Landside Transport chapter 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.	No

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			On this basis, it is proposed that further assessment from a MA&D perspective in the ES is not required.	
Technological or Manmade Hazards	Transport accidents	Rail	An existing rail terminal (Navigator North Tees Rail Terminal) is located southwest of the Proposed Scheme and is operated by Navigator. The Applicant proposes to utilise the existing rail terminal for the transportation of feedstock to the Proposed Scheme and also transportation of final products from the Proposed Scheme.	Yes O
Technological or Manmade Hazards	Transport accidents	Waterways	The Proposed Scheme is located immediately adjacent to the River Tees, which carries significant water traffic and will also be used by the Proposed Scheme to transport SAF and naphtha. It is also proposed to use the River Tees to transport construction components and equipment. Therefore, it is proposed to scope in this major event type for further consideration in the ES.	Yes C, O, D
Technological or Manmade Hazards	Transport accidents	Aviation	There have been no major air accidents in the UK since the Kegworth incident in 1989 (**Ref 19.21**). The closest airports/airfields are Teesside International Airport which is located approximately 14km south west of the Proposed Scheme and Fishburn Airfield which is located approximately 19km north west.	No
Technological or Manmade Hazards	Pollution accidents	Air	**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	

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			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 emissions from the SAF Plant which will include pollutants associated with the combustion of waste and pollutants (including amines) associated with the Carbon Capture process. The introduction of these new emission sources and pollutants will require an application for 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 event are not anticipated during construction and operation of the Proposed Scheme. It is therefore it proposed not to evaluate this further in the ES.	
Technological or Manmade Hazards	Pollution accidents	Land	During construction and decommissioning there may be an increase in the risk of leaks and spillages of hazardous materials associated with construction and decommissioning activities. During construction and decommissioning, standard control measures would be implemented by the appointed contractor and identified in the Outline CoCP or in the Demolition Environmental Management Plan to manage the risk of spillages and leaks. It is therefore proposed not to evaluate this further in the ES for the construction and decommissioning phases.	Yes O

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			During operation, it is understood that a range of new hazardous wastes may be generated and stored on site 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	Several unnamed lakes and inland rivers are recorded within and immediately adjacent to the Site. The Proposed Scheme borders the River Tees to the southeast and south with part of the Site covering jetties and wharfs. In addition, several aquifers are present in the study area, including a Secondary Undifferentiated Aquifer (superficial Tidal Flats deposits), a Secondary B Aquifer (Mercia mudstone bedrock deposits) and a Principal Aquifer (Sherwood sandstone group). It is important that these water resources are protected. During construction and decommissioning there may be an increase in the risk of leaks and spillages of hazardous materials associated with construction and decommissioning activities. During construction and decommissioning, standard control measures would be implemented by the appointed contractor and identified in the Outline CoCP or in the Demolition Environmental Management Plan to manage the risk of spillages and leaks. It is therefore proposed not to evaluate this further in the ES for the construction and decommissioning phases. During operation, it is understood that a range of new hazardous materials may be stored on Site, however quantities and characteristics are not fully known at this time. Therefore, it is	Yes O

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			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. Underground and above-ground electrical transmission lines are present across the Site, the responsibilities of which lie with the relevant local operator or company should this infrastructure fail. The responsibility for any diversion works and the installation of new electrical 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.	No
Technological or Manmade Hazards	Utilities failures	Gas	Underground and above-ground gas transmission pipelines are present across the Site, 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 in addition to remaining in the	No

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			design risk register and as such does not require further consideration in the MA&D assessment. The Proposed Scheme involves the installation of a new natural gas pipeline as part of the general utilities for the Site. Installation and connection of this new pipeline would be undertaken with the agreement of the pipeline operator, which will include providing risk assessment and method statements covering the works before they can commence, under existing legal requirements and as such does not require further consideration in the MA&D assessment.	
Technological or Manmade Hazards	Utilities failures	Water supply	The Kielder Water Resource Zone (WRZ) serves the vast majority of Northumberland which is supplied primarily by Kielder Water (reservoir). Most development coming forward in this zone would be capable of being supplied without problem. 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 brought in by tankering, or the facility could be safely shut down until supplies are restored. Therefore, further consideration in the ES is not required.	No
Technological or Manmade Hazards	Utilities failures	Sewage system	No use of the sewage system associated with the Proposed Scheme. During the construction phase temporary portable systems will be in place covered by H&S welfare requirements.	No
Technological or Manmade Hazards	Malicious Attacks	Unexploded Ordnance	A Zetica UXO Pre-Desk Study (dated 14 April 2023) (**Ref 19.31**) recorded strategic World War I (WWI) and WWII targets within the vicinity of the Proposed Scheme and records indicate several high explosive bombs fell in close proximity. The Geology and Soils	Yes C

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			Chapter recommends that a detailed desk study is commissioned to assess and potentially zone UXO hazard levels within the Site. Measures would be undertaken during construction to brief operatives to raise awareness of this issue, and to define appropriate response strategies should this be discovered during the construction 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.	
Technological or Manmade Hazards	Malicious Attacks	Attacks: ■ Chemical; ■ Biological; ■ Radiological; and ■ Nuclear.	Extremists 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.	No
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 is unlikely to be a target for this type of event due to the low number of exposed targets.	No

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
Technological or Manmade Hazards	Malicious Attacks	Crowded places	The Proposed Scheme does not fall within the definition of a crowded 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.	No
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 SAF Plant could render the Proposed Scheme more vulnerable to a cyber-attack. Notwithstanding this, it is not considered to be more vulnerable to attack than similar infrastructure installed and operating in the UK.	No
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 (**Ref 19.21**). 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.	No

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
Technological or Manmade Hazards	Engineering accidents and failures	Bridge failure	Bridge works are not proposed as part of the Proposed Scheme.	No
Technological or Manmade Hazards	Engineering accidents and failures	Flood defence failure	The study area associated with the Proposed Scheme does not benefit from flood defences. The design of the Proposed Scheme has been developed to include allowances for future climate change predictions that could result in flooding. The potential risk of breech events will be considered in the Flood Risk Assessment produced as part of the Environmental Impact Assessment.	No
Technological or Manmade Hazards	Engineering accidents and failures	Mast and tower collapse	There are no towers or masts other than stacks associated with existing industrial facilities in close proximity to the Proposed Scheme or being built as part of the Proposed Scheme. The Proposed Scheme will involve the construction of flares, vents and stacks associated with the SAF Plant however, these will be designed and constructed in accordance with relevant standards.	No
Technological or Manmade Hazards	Engineering accidents and failures	Property or bridge demolition accidents	The Proposed Scheme may involve the demolition of existing unused industrial buildings located within the Site. Any demolition works would be managed under the CDM Regulations 2015. The risks of accidents occurring during these works would be taken into account by the appointed contractor, and considered as part of their detailed methodology and risk assessments in advance of these works.	No

MA&D Group	MA&D Category	MA&D Type	Basis of Decision to Scope In / Out	Scope In? Phase
			Surveys would be undertaken prior to the demolition of buildings and structures to confirm whether any potentially harmful substances (e.g. asbestos) are present, and to determine the risk to people. Therefore, further consideration is not required in the ES.	
Technological or Manmade Hazards	Engineering accidents and failures	Tunnel failure / fire	There are no tunnel structures proposed as part of the Proposed Scheme.	No

Note: C = Construction, O = Operation.

19.7.11. To summarise the following MA&D types have been scoped in for further assessment in the ES:

- Major accident hazard chemical sites (construction, operation and decommissioning phase);
- Major accident hazard pipelines (construction, operation and decommissioning phase);
- Fuel storage (construction, operation and decommissioning phase);
- Rail (operation phase);
- Waterways (construction and operation phase);
- Pollution accidents to land (operation phase);
- Pollution accidents to water (operation phase); and
- UXO (construction phase).

19.8. PROPOSED ASSESSMENT METHODOLOGY

19.8.1. In line with the IEMA Primer (**Ref 19.17**), 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.

SIGNIFICANCE OF EFFECT CRITERIA

19.8.2. By definition, a major accident and / or disaster would have a major Significant effect on the environment (including human health, welfare and/or the environment). Accordingly, any risks that could result in a major event without suitable mitigation, management or regulatory controls in place will be assessed as Significant in the context of EIA.

19.9. LIMITATIONS AND ASSUMPTIONS

19.9.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- The assessment of Major Accidents and Disasters will take into consideration the relevant embedded mitigation in the design and additional mitigation measures that are developed throughout the EIA process.

- 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 (**Ref 19.9**) and a 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.

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20. MARINE NAVIGATION

20.1. INTRODUCTION

20.1.1. This chapter sets out the proposed scope and methodology for the marine navigation assessment of the Proposed Scheme. It is supported by a technical appendix (**Appendix 20-A**) produced by NASH Maritime which details the datasets and study area used to scope the navigation risks, provides an overview of baseline conditions, and identifies the likely significant effects to be considered within this assessment.

20.1.2. Marine navigation is assessed for the construction phase only and the justification for this is outlined in **Section 20.7**.

20.2. POLICY, LEGISLATION AND GUIDANCE

20.2.1. **Table 20-1** below summarises the policy, legislation and guidance identified as part of this scoping exercise:

Table 20-1 – Marine Navigation – Summary of Key Policy, Legislation and Guidance

Policy/Legislation/Guidance	Description
Policy	
Department for Transport (DfT) Port Marine Safety Code 2016 (PMSC) (Ref. 20.1)	The Port Marine Safety Code sets out a national standard for every aspect of port marine safety. Its aim is to enhance safety for all who use or work in the UK port marine environment. It is endorsed by the UK Government and representatives from across the maritime sector and, therefore, there is a strong expectation that all harbour authorities will comply.
Legislation	
Tees and Hartlepool Port Authority Act 1982 (Ref 20.2)	An Act to authorise the Tees and Hartlepool Port Authority to exercise certain powers and duties as the harbour authority for the River Tees.
International Port and Ship Security (ISPS) Code 2004 (Ref 20.3)	An amendment to the Safety of Life at Sea (SOLAS) Convention (1974/1988) on maritime security, including minimum security arrangements for ships, ports and government agencies. It prescribes responsibilities to various parties to detect security threats and take protective measures against security incidents affecting ships or port facilities used in international trade.

Policy/Legislation/Guidance	Description
Guidance	
International Maritime Organisation (IMO) Revised Guidelines for Formal Safety Assessment 2018 (Ref 20.4)	Provides a methodology for identifying and evaluating hazards/ risks associated with marine operations, as well as appropriate mitigation measures, in a transparent and consistent manner.
Marine Guidance Note (MGN) 654 Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response 2021 (Ref 20.5)	This MGN highlights matters to be taken into consideration when assessing the potential of the Proposed Scheme to have effects on navigational safety and emergency response. The MGN applies in UK waters, Territorial Sea, and Exclusive Economic Zone. Although originally prepared for offshore renewables, it also provides useful guidance on the Navigation Risk Assessment (NRA) approach to be adopted for any UK marine Proposed Scheme.
River Tees Passage Plan 2021, PD Ports (Ref 20.6)	This guide is prepared by PD Ports to assist mariners in constructing a passage plan when navigating within the River Tees.

20.2.2. Other notable legislation and guidance is detailed in **Appendix 20-A**.

20.3. STUDY AREA

20.3.1. Two scenarios are currently under consideration by the Applicant for marine operations during the construction phase of the Proposed Scheme: (1) at Wilton Engineering Wharf; or (2) at Clarence Lower Wharf. These two scenarios are described fully in **Chapter 2: Site and Proposed Scheme Description**.

20.3.2. The Study Area extends upstream beyond the Transporter Bridge to include Wilton Engineering, and downstream beyond Tees Dock to PD Ports Container Terminal 1. The Study Area has been selected to include both Wilton Engineering Wharf and Clarence Lower Wharf as the two key potential locations for unloading, as well as key navigation operations on the Tees that might be impacted by the Proposed Scheme.

20.3.3. **Appendix 20-A**, Figure 1, shows the Study Area for the assessment.

20.4. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

20.4.1. A preliminary baseline study has been undertaken by NASH Maritime to inform this Scoping Report, and is included in **Appendix 20-A**. Table 1 of **Appendix 20-A** summarises the key navigational features within the Study Area.

20.4.2. PD Ports operates as the designated Statutory Harbour Authority for the Port of Tees and Hartlepool, known collectively as Teesport. PD Ports oversees all vessel traffic management, ensuring safe navigation and maintaining channel depths for the vessels that visit Teesport.

20.4.3. Teesport is amongst the largest and busiest ports in the UK and has a diverse mix of vessel traffic activity. The port is primarily known for its bulk cargo operations and container handling. Commercial vessels range from small port service crafts to large commercial tankers and can be draught restricted.

20.4.4. Teesport harbour has extensive marine infrastructure including terminals, quays, jetties and berth; consequently, careful passage planning is crucial for ensuring safe navigation through this busy area.

20.4.5. The main navigational obstacle for ocean-going vessels transiting to Wilton Engineering is the Tees Transporter Bridge, which has an air draft of 48.2m at High Astronomical Tide (HAT). The passage into Clarence Lower Wharf is located before the Transporter Bridge and is therefore not affected by the restriction.

20.4.6. The dredged depth of the Tees Approach Channel starts at 15.4m Chart Datum (CD) and reduces to 14.2m CD at the mouth of the river Tees. The dredged channel continues up the River Tees decreasing to a depth of 5.1m CD in the vicinity of Wilton Engineering Wharf. The dredged channel depth at Clarence Lower Wharf is 5.7m CD but, according to PD Ports during consultation, the minimum expected depth on a berth in Clarence Lower Wharf is 3.1m CD.

20.4.7. Liaison with the Statutory Harbour Authority is currently ongoing and further baseline data will be collated to inform the PEIR and ES. Recorded minutes of the consultation meeting are included in **Appendix 20-A**.

FUTURE BASELINE

20.4.8. The future baseline environment has not yet been determined and further consultation with the Statutory Harbour Authority will inform the basis of the future baseline environment for the NRA.

20.5. SENSITIVE RECEPTORS

20.5.1. The following sensitive receptors have been identified, as they could be affected during the construction phase of the Proposed Scheme:

- Proposed Scheme vessels:
  - MC-Class vessels with a Length Overall (LOA) of 173m, beam of 43m and summer draught of 6.5m to offload up to 200 modules during an 18-month period.
  - An alternative North Sea Barge with 90m LOA, 31m beam and 5.0m draught for the same proposed operation.

- These vessels are being considered for the construction phase only; it is assumed that operational phase export vessels will be unchanged from current baseline.

- Existing Port vessels:
  - These include cargo, tankers, port service, dredging and other vessels, as described in Section 3.5 and Table 2 of **Appendix 20-A**.
- Existing Infrastructure within the Study Area e.g. wharf structures
  - Table 1 of **Appendix 20-A** provides a summary of key navigational features.

20.6. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

20.6.1. Within the PMSC, 'As Low As Reasonably Practicable' (ALARP) is an industry-wide concept applying to both health and safety and port marine safety. The core concept is that of 'reasonably practicable' which involves weighing up risk against the effort, time and money needed to control it. The PMSC specifically references ALARP with respect to NRAs.

20.6.2. From the NRA process, a set of mitigation measures or mitigation controls will be identified as part of the Environmental Statement (ES), which would be implemented either directly into the Proposed Scheme design, or via management practices. The overall objective is to maintain risk levels within a limit that is deemed ALARP. By virtue of the marine environment, these controls would be embedded within the background navigational environment, and would likely include the following:

- Harbour Authority Safety Management System , which includes plans and processes to manage marine emergencies.
- Vessel traffic management and the reactive response to marine emergencies.
- Professional/ trained mariners' application of:
  i. IMO conventions of SOLAS
  ii. Convention on the International Regulations of Preventing Collisions at Sea .
  iii. International Convention of Standards of Training, Certification and Watchkeeping for Seafarers .
  iv. Ensuring compliance with the International Association of Marine Aids to Navigation and Lighthouse Authorities guidance on Aids to Navigation .

20.7. DESCRIPTION OF POTENTIAL LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

20.7.1. Section 5 of **Appendix 20-A** describes in detail the potential likely navigational effects associated with the construction phase which could be significant:

- **Obstruction of the navigation channel**: The current proposed Mediterranean mooring arrangements for construction phase vessels would obstruct the majority of the navigation channel at Wilton Engineering. Mediterranean mooring at Clarence Lower Wharf would completely block the channel. The anchors of the construction phase vessels secured in a Mediterranean mooring configuration would further contribute to the obstruction of the channel and create a hazard for small passing vessels (such as attendant tugs). Side-on mooring of the construction phase vessels at both offloading sites would have less of an impact on the navigational channel and passing vessels. Mediterranean mooring of the North Sea Barge would partially obstruct the channel, especially at Clarence Lower Wharf, but would probably allow the crossing of smaller vessels. Side-on mooring of the project barge at both sites would not affect the navigational channel.
- **Proposed Scheme vessel grounding:** The summer draught of construction phase vessels is deeper than the minimum depths at both considered berth locations; this means that offloading operations at both sites are extremely tidally limited, especially at Clarence Lower Wharf.
- **Proposed Scheme vessel contact**: There is a potential for contact between construction phase vessels and fixed structures as it passes the Tees navigation channel, particularly when it swings to enable a stern-on Mediterranean berthing. There is considered to be negligible difference in risk between the two wharf locations at this stage.
- **Proposed Scheme vessel breakout:** The potential breakout of construction phase vessels in Mediterranean mooring is a navigational concern during the marine operation. There is considered to be negligible difference in risk between the two wharf locations at this stage.
- **Collision with third party vessel**: There is the possibility of collisions between construction phase vessels and third-party vessels due to high vessel activity at Teesport, reduced manoeuvring space, and potential deviations from the main channel. There is considered to be negligible difference in risk between the two wharf locations at this stage.

OPERATION PHASE

20.7.2. The requirement for and likely volume of export vessel movements for final products from the Proposed Scheme during the operational phase is currently being investigated. If required, the Proposed Scheme will utilise existing operational marine infrastructure (the jetties identified in **Figure 1-2** and **Chapter 2: Site and Proposed Scheme Description**), including any existing navigational agreements already being implemented. Further assessment of the existing number of vessel calls at these berths, and the resulting capacity, will be undertaken for the PEIR.

20.7.3. As a result of the utilisation of this existing infrastructure and agreements, it is assumed that there will be no material change to the current baseline of vessels using

these existing facilities and, therefore, no likely significant effects are anticipated for the operation phase. As operational marine movements are still being investigated and subject to further discussions with the Statutory Harbour Authority on baseline use of the River Tees, the technical scope in relation to marine navigation and the operation phase will be confirmed in the PEIR.

DECOMMISSIONING PHASE

20.7.4. Given the length of the operational lifespan it is not considered appropriate to accurately determine the unknown characteristics of the baseline marine environment. Therefore, as stated in **Chapter 2: Site and Proposed Scheme Description**, a Decommissioning Plan would be prepared at the appropriate time to confirm use of marine infrastructure available and appropriate at the time.

20.8. ELEMENTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

20.8.1. The potential impacts identified at **paragraph 20.7.1** above could be significant and therefore should not be scoped out of the ES assessment.

20.8.2. The impacts that have been scoped into the assessment are outlined in **Table 20-2**, with further detail provided in **Appendix 20-A**.

Table 20-2 – Elements Scoped in or out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Increased risk of collision	Construction	☑		The Proposed Scheme would introduce a new source of vessel traffic to the Port environment. This has the potential to increase the risk of collision between Proposed Scheme vessels and third-party vessels. There is also a risk of collisions occurring between third party vessels as a result of action taken to avoid Proposed Scheme vessels. This is likely to be a greater risk at Clarence Lower Wharf due to the higher vessel activity.
Increased risk of contact	Construction	☑		Partial or complete blocking of the navigation channel can lead to contact between moored Proposed Scheme vessels and passing vessels. There is potential for contact between Proposed Scheme vessels and fixed structures as it passes the Tees navigational channel, particularly when swinging to enable a stern on Mediterranean berthing. This is likely to be a greater risk at Clarence Lower Wharf due to the higher vessel activity.

Element	Phase	Scoped In	Scoped Out	Justification
Increased risk of grounding	Construction	☑		The Proposed Scheme vessels have a summer draught of 6.5mCD and the minimum depth at berth at Wilton Engineering Wharf and Clarence Lower Wharf is 4.7mCD and 3.1mCD respectively. Vessels will have to operate over a narrow tidal window and contingencies during offloading operations, which can lead to grounding. This is likely to be a greater risk at Lower Clarence Wharf where the berth depth is shallower than at Wilton Engineering Wharf.
Increased risk of breakout	Construction	☑		Proposed Scheme vessels in Mediterranean mooring are at risk of breaking out, which could lead to contact of the vessel with fixed structures and cause significant damage to property and pose risks to the safety of personnel involved. There is likely to be little difference in risk between the two Wharf options.
Impact on Port Operations	Construction	☑		Any potential increase in vessel traffic associated with the Proposed Scheme could result in an increase in demand for port services such as anchorages and pilotage services, particularly during a restricted tidal window. This may affect availability of services leading to effects on port operations and subsequent increases in navigation risk. This is likely to be a greater risk at Clarence Lower Wharf due to the higher vessel activity.
Changes in navigation risk profile resulting from roll over operation	Construction	☑		Depending on the location of the roll over operation, there will likely be varying increases in navigation risk, which will require assessment. This is likely to be a greater risk at Clarence Lower Wharf due to the higher vessel activity.
Alongside berthing operations at Wilton Engineering	Construction		☑	Alongside-berthing operations currently takes place at Wilton Engineering and Clarence Lower Wharf. Providing the Proposed Scheme vessels are of similar specification and moors in a similar manner to current operations, this activity is not a departure from

Element	Phase	Scoped In	Scoped Out	Justification
and Clarence Lower Wharf				normal baseline activity and would be covered by the Port baseline risk assessment.

20.8.3. Inclusion of any assessment of the operational phase is subject to further baseline data collation and discussions with the Statutory Harbour Authority. It is currently anticipated that due to the existing navigational arrangements being implemented on the operational wharves shown in **Figure 1-2**, likely significant effects are unlikely but will be confirmed in the PEIR.

20.8.4. Due to the inclusion of embedded measures and consideration of the operational lifespan, the decommissioning phase is scoped out.

20.9. PROPOSED ASSESSMENT METHODOLOGY

20.9.1. Further assessment will be required; the approach to which will be discussed, and agreement sought, with the Statutory Harbour Authority. Based on the likely environmental impacts set out above, the scope of the assessment will include the following:

- Qualitative assessment informed by a Navigation Risk Assessment (NRA), which would inform a Marine Navigation ES Chapter (confirmed as required by the Statutory Harbour Authority in Minutes of Meeting, **Appendix 20-A**);
- Review of Port Operations; and
- Development of Marine Concept Plan.

DATA SOURCES

20.9.2. The following key data sources will be used to identify the baseline characterisation for the NRA and inform the ES:

- Accident and Incident data from the Statutory Harbour Authority, the Marine Accidence Investigation Branch (MAIB) and the Royal National Lifeboat Institution (RNLI);
- Vessel Simulation Study and Swept Path Analysis;
- Weather and environmental-based data;
- Automatic Identification System (AIS) data from a range of sources including the Marine Management Organisation (MMO) up to the year 2019 and third party data supplies for more recent years;
- Vessel movement statistics from Statutory Harbour Authority; and
- Navigational features and charted information from United Kingdom Hydrographic Office (UKHO) Admiralty Charts.

NRA METHODOLOGY

20.9.3. An NRA will be required to support the ES for the Proposed Scheme. The NRA outputs will inform the Marine Navigation ES Chapter and the NRA will be provided as an appendix to the ES.

20.9.4. To provide local stakeholder input, a hazard identification workshop will be held, which will bring together relevant navigational stakeholders for the area to discuss the potential impacts on navigational safety associated with the Proposed Scheme.

20.9.5. Following the risk assessment process and full consideration of navigation hazards, the need to implement further controls will be determined. Decisions relating to further controls will be agreed in consultation with the Statutory Harbour Authority to determine whether an ALARP state has been met for each risk.

20.9.6. The outputs of the NRA will be used to inform a judgement on significance of effects arising from the Proposed Scheme, and these will be reported in the Marine Navigation ES Chapter.

SIGNIFICANCE OF EFFECTS CRITERIA

20.9.7. The significance of potential effects will be evaluated using a systematic approach based on identification of the frequency of impact (i.e. sensitivity of a receptor to change) and the consequence of the impact (i.e. magnitude of change), consistent with the approach identified in **Chapter 3: Approach to EIA**.

20.9.8. The potential effects will be assessed in conjunction with the further assessment results, professional judgement, and also take into account matters identified through consultation with the relevant navigational stakeholders.

20.10. LIMITATIONS AND ASSUMPTIONS

20.10.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- Liaison with the Statutory Harbour Authority is ongoing and will inform the PEIR and ES as appropriate. Therefore, the above scope is subject to amendment in response to agreements made as part of this liaison.
- AIS data publicly available (by MMO) from 2018 has been used as this was what was publicly available at the time of undertaking the baseline study. It remains an accurate reflection of the current baseline and is an industry-standard approach at Scoping stage.
- The marine navigation baseline and impact assessment in any further assessment will be carried out based on the information available and response received at the time of preparation.
- The findings of this Scoping Report are based on the Proposed Scheme description set out in **Chapter 2: Site and Proposed Scheme Description**

provided by the Applicant relating to marine operations in the construction phase; and

- No baseline change assumed for operational phase owing to lack of information available on the types, number and routes of the barges used to transport the operational product. It is the intention that this information will be made available for an assessment to be included in the PEIR and ES, and for consultation with key stakeholders.

20.11. REFERENCES

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21. CUMULATIVE EFFECTS

21.1. INTRODUCTION

21.1.1. The EIA Regulations (**Ref 21.1**) 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.

21.1.2. 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 will be presented as a standalone chapter of the ES.

21.1.3. In line with Schedule 4, paragraph 5(e) of the EIA Regulations 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 which states *"the description of the likely significant effects on the factors specified in regulation 5(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at Union level (as they had effect immediately before exit day) or United Kingdom level which are relevant to the project, including in particular those established under the law of any part of the United Kingdom that implemented Council Directive 92/43/EEC and Directive 2009/147/EC"*.

21.1.4. Cumulative Effects may arise because of several different factors and combined changes. According to IEMA (**Ref 21.2**) 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"*.

21.1.5. The following types of Cumulative Effects will be considered in the ES:

21.1.6. **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 Public Right of Ways (PRoWs).

21.1.7. **Inter-project effects** – the residual environmental effects of the Proposed Scheme combining and interacting with the residual environmental effects of other, committed development(s), affecting the same receptor. For example, traffic effects upon users of the local road network because of the Proposed Scheme and a nearby industrial development.

21.2. POLICY, LEGISLATION AND GUIDANCE

21.2.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is detailed in **Table 21-1**. The National Planning Practice Guidance 2016 has been excluded from **Table 21-1** due to a lack specific policies regarding CEA.

Table 21-1 - Cumulative Effects – Summary of Key Policy, Legislation and Guidance

Policy / Legislation / Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy (EN-1) 2011 (**Ref 21.3**)	Sets out the government's policy for delivery of major energy infrastructure and is the primary basis for decision making. Paragraph 4.2.5 states: ■ *"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 NPS for Energy (EN-1) 2023 (**Ref 21.4**)	A draft NPS subject to consultation which sets out the Government's policy for delivery of major energy infrastructure. The drafts NPS will be the primary basis for decision making once designated. 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."* Paragraph 4.3.5 states: ■ *"The impacts of more than one development may affect people simultaneously, so the applicant should consider the cumulative impact on health in the ES where appropriate."* Paragraph 4.8.21 states: *"[…] development consent applications for power CCS projects should include details of how the captured CO2 is intended to be transported and stored, how cumulative impacts will be assessed and whether any necessary consents, permits and licences have been obtained."*

Policy / Legislation / Guidance	Description
National Planning Policy Framework (NPPF) 2021 (**Ref 21.5**)	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".*
UK Sustainable Aviation Fuel (SAF) Mandate 2022 (**Ref 21.6**)	Sets out the UK Government's introduction to Sustainable Aviation Fuel (SAF) blending mandate, which will place an obligation on fuel suppliers to supply a certain percentage of sustainable low-carbon aviation fuels from 2025. The Jet Zero Strategy, published in July 2022, sets out the government's wider strategy for decarbonising the UK aviation sector, and confirmed the expectation that SAF will play an important role in this transition.
Stockton-on-Tees Borough Council (SoTBC) Local Plan 2019 (**Ref 21.7**)	Sets out SoTBC'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.
Legislation	
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('The EIA Regulations') (**Ref 22.1**)	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 21.8**)	These Regulations provide specific thresholds of scale to determine if a development requires EIA. Planning Inspectorate Advice Note 17 (**Ref 21.9**) 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 Outlook Journal 2020 (**Ref 21.2**)	The EIA process requires the consideration of Cumulative Effects to be undertaken. However, guidance on this area of practice is often lacking, and a variety of methodologies are adopted by different practitioners. Volume 7 of the Impact Assessment Outlook Journal brings together a selection of articles, thought and opinion pieces on the subject of CEA in EIA.
Planning Inspectorate Advice Note 17:	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

Policy / Legislation / Guidance	Description
Cumulative Effects Assessment Relevant to Nationally Significant Infrastructure Projects (2019) (**Ref 21.9**)	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.

21.3. PROPOSED ASSESSMENT METHODOLOGY

21.3.1. 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 21.9**) 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.

21.3.2. 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

21.3.3. The assessment of Intra-project Effects will be based on the information and Study Areas within the technical chapters. This assessment considers any residual effects that are reported as Minor or above within the technical chapters. Minor effects, while not significant, are considered in the assessment on the basis that multiple minor effects may interact to result in a significant effect. Negligible residual effects reported in the technical chapters are considered unlikely to accumulate to the extent that a significant Intra-project effect would occur.

21.3.4. The assessment methodology for Intra-project Effects will involve the following key stages.

Stage 1 - Screening of Sensitive Receptors

21.3.5. 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

21.3.6. 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

21.3.7. 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

21.3.8. The significance classifications for Intra-project Effects will adhere to those described in **Chapter 3: Approach to EIA**. The criteria for these classifications will be detailed in the ES.

21.3.9. If significant residual Intra-project Effects are identified, additional mitigation measures will be proposed in the ES.

INTER-PROJECT EFFECTS

21.3.10. 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

21.3.11. Stage 1 of the approach outlined in Advice Note 17 (**Ref 21.9**) requires the identification of a Zone of Influence (ZOI) for each technical topic (derived from the Study Areas in considered within the ES for the Proposed Scheme, with other, reasonably foreseeable developments identified within those ZOI. These projects are termed 'Other Developments'.

21.3.12. '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 21.9**)).

21.3.13. **Table 20-2** 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 20-2** of Advice Note 17. 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 20.10**) 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'.

21.3.14. 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 50 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) (via local authorities such as SoTBC and PINS for NSIPs) 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 an approach for future development consents/approvals, where such development is reasonably likely to come forward and would likely be 'Other Developments'.

21.3.15. The long-list will be sent to the relevant local planning authorities (such as SoTBC) 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. The long-list will be updated throughout the ES stage, being finalised at a date ahead of submission of the ES. This date will be determined and outlined in the ES.

21.3.16. At the time of writing the long-list has not been drafted. However an initial review of major developments in the area has identified the following two NSIPs that meet the

criteria outlined above for inclusion in the draft long-list when it produced at the PEIR stage:

- H2Teesside[1] – A proposed 1,200 megawatt capacity Hydrogen Production Plant and associated infrastructure, including connectivity to the Net Zero Teesside Project (see below). The development is located within the Seal Sands industrial area, with Order Limits overlapping that of the Proposed Development; and
- Net Zero Teesside Project[2] - A full chain carbon capture, utilisation and storage (CCUS) project, comprising a CO2 gathering network, a combined cycle gas turbine (CCGT) electricity generating station and other associated infrastructure (including connectivity with the Proposed Development). The development is located within the Seal Sands industrial area and Redcar, with Order Limits overlapping that of the Proposed Development.

Stage 2 – Identify a Short-List of 'Other Developments'

21.3.17. 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

21.3.18. Information on Other Development(s) included within the short-list will be gathered from available third-party information sources within the public domain.

21.3.19. 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

21.3.20. 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

[1] https://infrastructure.planninginspectorate.gov.uk/projects/north-east/h2teesside/?ipcsection=overview#
[2] https://infrastructure.planninginspectorate.gov.uk/projects/north-east/the-net-zero-teesside-project/?ipcsection=docs

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 21.9**).

21.3.21. 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).

21.3.22. The assessment of Inter-project Effects will consider the following:

- combined magnitude of change;
- sensitivity/value/importance of the Receptor to change; and/or
- duration and reversibility of effect.

21.3.23. Through a combination of the qualitative evaluation presented in the ES and the environmental information available for Other Developments, conclusions will be drawn as to the likelihood for significant Inter-project Effects, i.e. those over and above, or different to, those identified for the Proposed Scheme on its own.

21.3.24. If significant residual Inter-project Effects are identified necessary mitigation measures will be proposed in the ES.

Significance Criteria

21.3.25. 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 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"*. The classifications used for this significance criteria will adhere to those outlined in **Chapter 3: Approach to EIA**.

21.4. LIMITATIONS AND ASSUMPTIONS

21.4.1. To ensure transparency within the EIA process, 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.

21.5. REFERENCES

Ref 21.1: 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 21.2: 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 21.3: 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 21.4: Department for Energy Security and Net Zero (2023). Draft 'Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf

Ref 21.5: UK Government. (2021). 'The National Planning Policy Framework (NPPF) 2021'. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

Ref 21.6: UK Government (2022). 'Sustainable Aviation Fuel Mandate'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147351/uk-sustainable-aviation-fuel-mandate-consultation-stage-cost-benefit-analysis.pdf

Ref 21.7: Stockton-on-Tees (2019). 'Local Plan'. Available at: https://www.stockton.gov.uk/media/2518/Local-Plan-2019/pdf/Local_Plan_2019.pdf?m=637810468860870000

Ref 21.8: 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 21.9: 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 21.10: UK Government. (2008). 'Planning Act 2008'. Available at: https://www.legislation.gov.uk/ukpga/2008/29/contents

22. SUMMARY

22.1. SCOPE OF EIA

22.1.1. It is proposed that the following environmental topics are included in the scope of the EIA:

- Air Quality;
- Noise and Vibration;
- Terrestrial Ecology;
- Marine and Freshwater Ecology;
- Water Environment and Flood Risk;
- Landscape and Visual;
- Greenhouse Gases;
- Climate Change Resilience;
- Material Assets and Waste;
- Socio-Economics;
- Population and Human Health;
- Traffic and Transport;
- Major Accidents and Disasters;
- Marine Navigation; and
- Cumulative Effects.

22.1.2. The following environmental topics are proposed to be scoped out of the ES:

- Cultural Heritage; and
- Geology and Soils.

22.1.3. The topic-specific matters proposed to be scoped in for further assessment within the ES are detailed in **Chapters 5: Air Quality** to **Chapter 21: Cumulative Effects**.

22.1.4. A table summarising each of the topic-specific matters proposed to be scoped out of the ES are shown in **Table 22-1** below.

Table 22-1 – Elements Scoped Out of Further Assessment

Topic Chapter	Impact	Phase
Chapter 5: Air Quality	FT Synthesis	Operation
	Syngas Compression and Clean-up	
	Upgrading	
	Utilities	
	Wastewater Treatment Plant	
	Surface Water Pond	
	Sub-Stations & ancillary equipment	
	Maintenance / Laydown/ Tar 1 & 2	
	Feedstock Silos	
	Marine Transport Infrastructure	
Chapter 6: Noise and Vibration	Construction traffic vibration impacts	Construction
	Noise impacts on human receptors arising from operation	Operation

Topic Chapter	Impact	Phase
	Vibration impacts on human receptors arising from operation	
	Road traffic impacts on human receptors arising from operation	
Chapter 7: Terrestrial Ecology	Statutory designated sites – local	Construction, operation, and decommissioning
	Bats	
Chapter 8: Marine and Freshwater Ecology	Marine Ecology: Phytoplankton	Construction and operation
	Marine Ecology: Marine plants and macroalgae	Construction
	Freshwater Ecology: There are no matters that are anticipated to be scoped out of further assessment.	N/A
Chapter 9: Water Environment and Flood Risk	There are no matters that are anticipated to be scoped out of further assessment.	N/A
Chapter 10: Landscape and Visual	Changes to other Landscape Character Areas within the Study Area arising from construction	Construction
	Changes to other Landscape Character Areas within the Study Area arising from operation	Operation
	Receptors beyond 2km	Construction and operation
Chapter 11: Cultural Heritage	Buried heritage assets within the Site	Construction
	Designated and non-designated heritage assets outside of the Site	Construction and Operation

Topic Chapter	Impact	Phase
Chapter 12: Greenhouse Gases	Disposal of waste	Construction
	Land use, land use change and forestry	
	Maintenance, repair, replacement, refurbishment	Operation
	Land use, land use change and forestry	
	Decommissioning process	Decommissioning
	Transport and disposal of materials	
Chapter 13: Climate Change Resilience	All Climate Variables: ▪ Construction site and laydown; Construction materials; Construction workers; and Plant and equipment.	Construction
	All Climate Variables: ▪ Decommissioning site and laydown; materials; workers; and Plant and equipment.	Decommissioning
	Change in annual average precipitation: ▪ SAF plant and components; ▪ Feedstock Processing and Storage area;	Operation

Topic Chapter	Impact	Phase
	■ Pipeline and cable connections (import and export) and Utility corridors; ■ Flares; ■ Bulk liquid storage; ■ Hard landscaping (including pavement, parking, temporary and permanent laydown areas); ■ Internal Conveyor Corridor; ■ Rail Terminal; ■ Drainage; ■ Marine transport infrastructure; and ■ Operational Staff.	
	Change in annual average temperature: ■ SAF plant and components; ■ Feedstock Processing and Storage area; ■ Pipeline and cable connections (import and export) and Utility corridors; ■ Flares; ■ Internal Conveyor Corridor; ■ Drainage; ■ Marine transport infrastructure; and ■ Operational Staff.	
	Drought: ■ Feedstock Processing and Storage area; ■ Pipeline and cable connections (import and export) and Utility corridors; ■ Flares;	

Topic Chapter	Impact	Phase
	▪ Internal Conveyor Corridor; ▪ Drainage; and ▪ Operational Staff.	
	Relative Humidity: ▪ Hard landscaping (including pavement, parking, temporary and permanent laydown areas); ▪ Internal Conveyor Corridor; ▪ Rail Terminal; ▪ Drainage; and ▪ Operational Staff.	
	Wind: ▪ Internal Conveyor Corridor; and ▪ Rail Terminal.	
Chapter 14: Materials and Waste	Consumption of material resources	Operation
	Disposal and recovery of waste	
	Consumption of material resources	Decommissioning
	Disposal and recovery of waste	
	Impacts and effects associated with the extraction of raw resources and the manufacture of products	Construction and operation

Topic Chapter	Impact	Phase
	Impacts and effects resulting from the transportation of material resources and waste to and from the site	
	Impacts on human health and controlled waters as a result of contaminated site arisings from the Proposed Scheme	
Chapter 15: Socioeconomics	Employment generation (direct, indirect and induced)	Operation
	Increased demand for community infrastructure and services due to an influx of temporary workers	Construction
	Employment generation (direct, indirect and induced)	Decommissioning
	Loss of employment opportunities	
Chapter 16: Population and Human Health	Private Property and Housing	Construction and Operation
	Community Land and Assets	
	Terrestrial Businesses	
	Businesses that rely upon access to the River Tees	
	Recreational users of the River Tees	
	Human Health	
	Walkers and Cyclists	Operation

Topic Chapter	Impact	Phase
	Terrestrial Recreation	
Chapter 17: Geology and Soils	Contaminated soil and detriment to Human Health	Construction and Operation
	Controlled Water Body Contamination (including Ramsar and SSSI sites)	
	Hazardous Ground Gas to accumulate within confined spaces	
	Built Environment – detriment of pipes and cables from aggressive ground contaminants over time.	
	Agricultural Soils	
	Mineral Resources	
Chapter 18: Traffic and Transport	Generation of operation traffic	Operational
	Generation of decommissioning traffic	Decommissioning
Chapter 19: Major Accidents and Disasters	Geophysical: ▪ Earthquakes; ▪ Volcanic Activity; ▪ Landslides; ▪ Sinkholes; and ▪ Tsunamis.	Construction, Operation and Decommissioning
	Hydrological: ▪ Avalanches.	Construction, Operation and Decommissioning

Topic Chapter	Impact	Phase
	Climatological and Meteorological: ■ Cyclones, hurricanes, typhoons, storms and gales; ■ Thunderstorms; ■ Wave surges; ■ Extreme temperatures (Heatwaves; and Low (sub-zero) temperatures and heavy snow); ■ Droughts; ■ Solar Flares; ■ Solar Energetic Particles; ■ Coronal Mass Ejections; ■ Fog; and ■ Wildfires (forest, bush/brush and pasture).	Construction, Operation and Decommissioning
	Biological: ■ Disease epidemics; ■ Animal Diseases; and ■ Plants (invasive plan species).	Construction, Operation and Decommissioning
	Societal: ■ Extensive public demonstrations which could lead to violence and loss of life; ■ Widespread damage to societies and economies; ■ The need for large-scale multi-faceted humanitarian assistance; ■ The hindrance or prevention of humanitarian assistance by political and military constraints; ■ Significant security risks for humanitarian relief workers in some areas; ■ Famine; and	Construction, Operation and Decommissioning

Topic Chapter	Impact	Phase
	▪ Displaced population.	
	Industrial and Urban Accidents: ▪ Nuclear; ▪ Dam breaches; ▪ Mines and storage caverns; and ▪ Fires.	Construction, Operation and Decommissioning
	Transport accidents: ▪ Roads; and ▪ Aviation.	Construction, Operation and Decommissioning
	Utilities failures: ▪ Electricity; ▪ Gas; ▪ Water Supply; and ▪ Sewage System.	Construction, Operation and Decommissioning
	Malicious Attacks: ▪ Attacks (chemical; biological; radiological; and nuclear); ▪ Transport systems; ▪ Crowded places; ▪ Cyber; and ▪ Infrastructure.	Construction, Operation and Decommissioning
	Engineering accidents and failures: ▪ Bridge failure; ▪ Flood defence failure	Construction, Operation and Decommissioning

Topic Chapter	Impact	Phase
	■ Mast and tower collapse; ■ Property or bridge demolition accidents; and ■ Tunnel failure / fire.	
Chapter 20: Marine Navigation	Alongside berthing operations	Construction
Chapter 21: Cumulative Effects	There are no matters that are anticipated to be scoped out of further assessment.	N/A

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